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COMPUTERWORLD

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Vol. XVI, No. 28



Koufax to Face Ruth at Schibe

By Bruce Hoard

CW Staff

PHILADELPHIA — Imagine Sandy Koufax peering down from the mound at a sign from Roy Campanella. Babe Ruth is crouched insolently in the batter's box, waiting for a 100-miles-per-hour fastball. It's a hanging curve instead, but the Sultan of Swat times his swing perfectly, launching a towering home run deep into the left field seats of Schibe Park.

Sound fantastic? It could happen this Wednesday night when the greatest baseball stars of all time and a nationwide radio audience gather for "The Greatest Game Never Played."

Compliments of a computer, of course.

What started out last spring as a bull session among Don Weber and

(Continued on Page 8)

Burroughs, User May Settle Suit

By Bob Johnson

CW New York Bureau

DETROIT — A Burroughs Corp. spokesman confirmed here last week that an out-of-court settlement is being negotiated for a massive lawsuit brought against the vendor in May.

The Medical College of Wisconsin, Inc. is seeking combined damages of more than \$160 million from Burroughs. The user filed a 14-page complaint May 4 in the Eastern District Court of Wisconsin, which charges that a Burroughs Hospital Information System (BHIS) that was supposed to provide computer hardware and software and a complete hospital administration accounting and financial system was of "substantially less value" than the system for

(Continued on Page 6)

User Says Relational, Yes; SQL/DS, Maybe

By Susan Blakeney

CW Staff

ORLANDO, Fla. — "From a long-range standpoint, we're convinced that relational is the way to go ... but we're not sure that SQL/DS provides the answer."

Those are the feelings of Nancy Gude, DP staff development manager for *The Orlando Sentinel*, the largest daily newspaper in central Florida. The paper is one of the first users of IBM's fully supported relational data base management system, SQL/DS.

SQL/DS is the acronym for Structured Query Language/Data System. Introduced in January 1981, it was designed to reduce installation time and simplify data access and management.

Gude said that the *Sentinel* chose SQL/DS because it provides its users with an easy-to-use query language and was less expensive than any of the alternatives it examined. The *Sentinel* uses SQL/DS to provide comparative sales information to the ad-

(Continued on Page 6)

Eight Enter Innocent Pleas In IBM Trade Secrets Case

By Jeffrey Beeler

CW West Coast Bureau

SAN JOSE, Calif. — Eight suspects in a major industrial espionage case recently pleaded innocent to charges they participated in a scheme to steal IBM trade secrets.

The pleas were entered in U.S. District Court here July 1, just one day after the individuals were indicted for their alleged role in the theft plot [CW, July 5].

One of the suspects, Kunimasa Inoue, works as a programmer for Hitachi America Ltd. in nearby San Francisco. Two others, Kenji Hayashi and Isao Ohnishi, are employed as a senior engineer and section manager, respectively, at Hitachi America's parent company, Hitachi Ltd., in Japan.

Innocent pleas were also entered by Keizo Shirai, who works as a section manager at Nissei Electronics Ltd. in Japan, and Tom Yoshida, president of Santa Clara, Calif.-based NCL Data, Inc.

The three remaining suspects to be arraigned here July 1 include Barry Saffaie, product manager with National Advanced Systems, Inc. (NAS); Raymond Cadet, a former NAS and IBM employee; and Tabasom Ayazi, an Iranian student studying in the U.S.

Vendors Not Developing New Mainframe Packages; Industry Analysts Tell Why

By Lois Paul

CW Staff

Mainframe users looking for introductions of significant software packages have been disappointed so far this year. Vendors seem to have spent most of their efforts enhancing already available packages.

That does not mean, however, that vendors have stopped developing mainframe software. It just means that they have postponed those efforts.

This period of quiet in the development of mainframe packages is being attributed by analysts to the advent of microcomputers and the growth of consumerism within the software industry. "In terms of dollars spent, mainframe software still is going strong," noted Carol Weismann, manager of the Software and Services Information program at International Data Corp. in Framingham, Mass. "However, in terms of packages, the activity is strongest in the low end of the marketplace, especially in products for desktops or micro-

computers," she explained.

Weismann sees a scramble among mainframe software vendors for shares in the desktop software market. "Anybody who can say that 'maybe in 10 years we will want a chunk of the market' has to go fight for it now," she said. "Companies have only a limited amount of resources to invest in new product development, so of course they are going to shelve their mainframe stuff for a while."

"By 1985 or 1986 — no later, I think — we are going to see an infusion of new lifeblood into the mainframe marketplace," she continued. "Once that new end-user market has been tapped and the lay of the land has been established, I think we are going to see a whole new level of activity with the mainframe end of the business — maybe even in the equipment end as well."

Herb Gepner, software analyst for Data Decisions, Inc. in Cherry Hill, N.J., said one reason for the lack of announcements of new mainframe software is the lack of announcements of new hardware.

"I really think everybody is looking more toward the micro market at this point," Gepner said, adding that nothing major is coming out of this area either. "Everybody is duplicating. The technology just has not broken."

Although he believes it is too early to use the term "saturated," Gepner

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This Vice-President 'Networked' Long Before It Became the Fashion

By Lois Paul

CW Staff

DENTON, Texas — Although the term "networking" was not in vogue in 1949 when Mary Batchelor began working, she has used the concept well during her 32-year career in data processing.

Batchelor is vice-president of operations for Scott Instruments here. The company was formed in 1976 by her long-time associate, E.V. Scott; his son, Dr. Brian Scott; and Lee H. Hardesty.

Batchelor met the elder Scott at her first job at Chance Vought Aircraft, where she began in 1949 as a secretary in the engineering department. Scott took Batchelor and other Chance Vought people with him when he made job changes to

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COMPUTERWORLD

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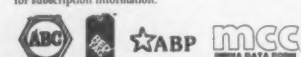
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Former Sheriff's Deputy Pulls Jail Term For 'Accessing' Ex-Employer's Data Center

By Jeffrey Beeler

CW West Coast Bureau

LOS ANGELES — A former sheriff's deputy has been convicted under the California computer crime law for repeatedly gaining unauthorized access to data belonging to the law enforcement agency where he once worked.

Ralph Davenport continued to avail himself of his ex-employer's data center months after he left the Los Angeles County Sheriff's Department to go to work for a private investigation firm. Between October 1981 and last January, Davenport telephoned the data center at least 287 times and, after falsely identifying himself as a law enforcement of-

ficer, asked to be supplied with various criminal histories from the installation's IBM 370/158.

He then used the ill-gotten information, which is intended for law enforcement personnel only, to benefit his new employer and his own private investigations, according to local Deputy District Attorney Clifton Garrott.

Davenport's illicit activities were eventually detected and led to his arrest and subsequent conviction for computer fraud. On June 2, he was sentenced to six months in county jail and was put on four years' probation.

At no time during his four-month crime spree did the former deputy

sheriff ever gain direct, on-line access to the data center's system or files, Garrott said. Instead, he got what he wanted through the installation's personnel, who were apparently convinced his requests for information were legitimate.

Modus Operandi

In general, Davenport's method of obtaining confidential crime data worked as follows: After calling the data center by telephone, he identified himself by one of several assumed names, all of which belong to bona fide sheriff's department investigators. He then asked his unsuspecting listeners to furnish him with information from one or another of the data center's crime histories, each of which lists a particular crook's physical description, last known address, conviction record and pending criminal charges.

If a data center operator was unable to answer the inquiry immediately and asked Davenport for his phone number, he usually claimed to be "out in the field" and offered to call again in "a couple of hours," Garrott said. Davenport then made good on his promise and had a clerk read the desired crime information to him over the telephone.

Davenport's fraudulent data-gathering scheme might still be operating had it not been exposed by accident several months ago. The discovery came when an unsuspecting data center employee called to leave a message for a narcotics division investigator whom the ex-deputy sheriff had just impersonated over the phone, Garrott said.

By sheer coincidence, the narcotics officer himself happened to field the call and immediately denied ever having requested the information that the data center operator was trying to deliver. In the wake of that incident, the sheriff's department launched an investigation that eventually led to Davenport, Garrott said.

Suspects Plead Innocent

(Continued from Page 1)

dered to reappear in court Aug. 23, when their case is tentatively set to go to trial.

Each of the eight suspects in the industrial espionage scandal was allegedly involved in an illegal plot to buy top-secret IBM product information from undercover Federal Bureau of Investigation agents posing as electronics thieves. Altogether, the investigators received \$648,000 in illicit payoffs in exchange for promises to supply highly sensitive design manuals, magnetic tapes and other technology that was allegedly repeatedly described to the suspects as stolen.

More than \$620,000 allegedly came from businessmen representing Hitachi. The balance of the money was reportedly paid by representatives of another leading Japanese electronics firm, Mitsubishi Electric Corp.

All eight of the suspects who pleaded innocent here recently have been indicted only in connection with the Hitachi side of the alleged theft scheme.

In all, the scandal has resulted in

indictments or charges against 22 individuals, nine of whom live in Japan, where their extradition status remains uncertain. All nine Japanese citizens are affiliated with Hitachi.

The remaining five suspects work for either Mitsubishi or its U.S. subsidiary. Unlike their Hitachi counterparts, none of the Mitsubishi group has been indicted yet because on June 30, attorneys for the five suspects were granted a brief delay in presenting their case before a federal grand jury.

On the Hitachi front, Ayazi has been indicted for receiving and selling stolen property. Saffaie and Cadet, meanwhile, have been indicted for transporting and receiving stolen property.

Cadet, whose alleged involvement in the IBM trade-secrets theft case was not disclosed until June 30, was taken into custody one day later and was soon released on bail.

The rest of the eight indicted suspects — Inoue, Hayashi, Ohnishi, Shirai and Yoshida — face charges of conspiring to transport stolen property.

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Four Mainframe Users Making Shift to Packages

By Susan Blakeney
CW Staff

Mainframe users are tending to buy rather than build software solutions, utilize microcomputers to perform some applications and are steering clear of unproven products, if interviews with four corporate DP managers last week are any indication.

David Blackwell, executive vice-president and chief administrative officer of Ball Corp.'s Information Services Division in Boulder, Colo., said his shop has "shifted from making to buying" whenever possible. He also said that Ball is purchasing more software now than a year ago because "it's more economical in the long run. It allows us to get on the street with a new system sooner."

Borg-Warner Chemicals, Inc. in Chicago is also more inclined to buy packages rather than produce home-grown software, according to John Brown, manager of systems and programming maintenance. Borg-Warner's software purchasing plans have not been hindered by the current economy, he said, claiming that he is buying more software now than last year.

Dick Sindt, DP manager at Bendix Corp., Ann Arbor, Mich., concurred on the strategy question. "We're leaning more and more toward buying, and we're buying more now than ever before."

"The whole Bendix Corp. is pushing us in that direction — it's more economical and you're going to get a more uniform package ... without the idiosyncrasies of the home-grown applications," Sindt said.

Hertz Corp.'s staff vice-president of management systems and services in New York, Bruce Curry, also agreed

that purchased software is the trend — but his company "tries to look at every major application" on the market before buying, and "if we have too many reservations about a package, we try to make it ourselves."

Curry maintained, however, that Reaganomics is impacting his department. "It's getting harder to justify new projects," he said.

Shift to Micro?

Asked whether they have been tempted to shift to comparatively inexpensive microcomputer hardware and software, the four managers' responses were fairly consistent. "We've definitely moved to stand-alone micro applications for certain things," Blackwell said, "and we've gone quite heavily into the mini market, too."

Brown said that although his com-

pany "very seldom looks to micros," it has brought a few in-house, and he foresees the micro infiltration spreading.

Curry said Hertz has started to do some work on micros and predicted future growth in that direction. Bendix does not use microcomputers, Sindt said, but he was careful to add "yet."

When polled on whether they sense a certain level of stability in the software industry, the DP managers differed in their responses.

Blackwell argued that the relatively stable vendors are the established ones, such as Cullinane Database Systems, Inc. and Pansophic Systems, Inc., but he pointed out that they are receiving competition from countless new companies. "The real challenge is going to be in acquisition — picking the software that has some

staying power and can get the job done," he added.

Brown maintained that there is more stability in the industry now because the products have been around longer, and software is becoming more and more reliable.

Sindt and Curry were uncertain about the stability of today's software arena, but all four agreed that the industry is exploding and they are, therefore, leery of trying new and untried programs from relatively new companies.

Sindt summed up the situation by saying, "I always look at how a company is going to support me on these expensive software products ... and certain companies will probably dominate the industry — McCormack & Dodge, Cincom, IBM. I wouldn't touch anything from anybody that was brand new."

No New Mainframe Packages Introduced

(Continued from Page 1)

acknowledged "that the mainframe marketplace has peaked. We have hit a lull."

"I can only hope that this plateau is, in fact, just a plateau, and that there will be some sort of a resurrection and a revival in the technological advancement area."

New Mainframe Products

The only new mainframe software products that Gepner could cite in the last six months have been in artificial languages and application generators. "There has been a lot of talk about relational data base management systems [DBMS] — a lot of talk and not very much action," he added.

ed.

Doug Crawford, manager of data base management services at Real Decisions Corp. in Stamford, Conn., disagreed with Gepner's assessment, noting the increasing availability and usage of relational systems.

Crawford also cited the information center as the development arena for a lot of new software products. His concern is that more development in the area of natural languages is required to fully take advantage of this concept.

Micro Software

In terms of microcomputer software, Crawford cited the need for standardization or at least the emergence of market leaders to stop the duplication described by Gepner.

Len Bergstrom, director of client services for Real Decisions, said the major growth he has seen has been in the area of decision support systems and microcomputer packages.

The overall growth rate of packaged software products during the 1980-1981 period was 45%, 14% higher than predicted by Input, Inc., according to Ken Churilla, director of that firm's information services industry program. The unexpected growth, which occurred mainly in the minicomputer and microcomputer areas, resulted in part because DP managers facing tight budgets are increasingly buying packages rather than attempting in-house development of software, he said. Another factor was the growth of microcomputers.

"I think software has really come of age," Churilla said. "I think 1981 was a turning point. I think we are going to see very strong growth over the next five years."

New Architecture

A spokesman for Info-Dyne, Inc. in Minneapolis described a trend toward a new software architecture among software developers as a means of reducing the labor-intensiveness of the development process and increasing the flexibility of their software products.

"They are creating more modular kinds of applications, with more sub-modules being usable across applica-

Who's Affected: Vendors? Users?

Software industry watchers generally acknowledge that the economy has been a factor in slowing down the growth of the mainframe software market during the past year. They disagree, however, on whether it is the vendors or the users who have been affected.

Herb Gepner, software analyst for Data Decisions, Inc., noted that some large mainframe software houses are experiencing problems. In addition, firms are cutting back on research and development efforts, he added, partly because people costs are so high.

"I think that when the economy gets rolling again, you probably will see some pickup in marketing, and this, in turn, will reflect the ability for younger, smaller companies to break out with new ideas," Gepner said.

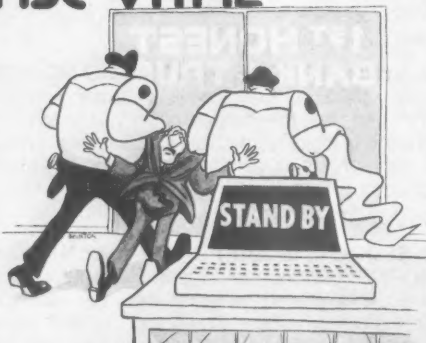
Regarding the effect of the economy on the software industry, Doug Crawford, manager of data base management services for Real Decisions Corp., feels it is the users who are experiencing the crunch. "I think the companies that would purchase the software services packages are definitely holding a little bit tighter rein on their purse strings right now in terms of usage of consulting and other services."

He shared Gepner's optimism about the future. "If the current signs are correct, we are entering into an upturn. I think if people have been holding back, they may let loose a little bit and you might see a spurt in purchasing of software systems and packages or software services."

tions," the Info-Dyne spokesman explained.

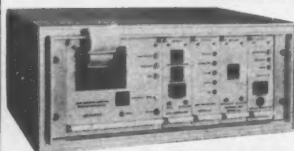
He also echoed the feeling that software is becoming more of a consumer's market, with users becoming more knowledgeable and demanding more of the vendors.

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IBM Follows STSC's Lead, Brings Out APL2

By Lois Paul
CW Staff

WHITE PLAINS, N.Y. — Following hard on the heels of STSC, Inc.'s recent announcement of a nested-arrays extension to its APL*Plus system [CW, June 28], IBM has unveiled APL2 software that includes general arrays. Like nested arrays, these may contain other arrays as well as a mixture of alphabetic and numeric data.

Available for users of IBM 370, 4300 and 30 series systems running under VM/370 with CMS, APL2 reportedly has extensions to APL operators, additions to APL primitive functions, programmable error handling, complex arithmetic, character set extensions and an extended APL syntax.

APL2 is an Installed User Program (IUP), according to IBM, which means it has been used and tested by a variety of VM/CMS internal IBM site users but has not gone through the lengthier process that generally precedes the release of a software product. Michael Crick, an independent APL consultant in Bellevue, Wash., suggested that the reason the vendor released an IUP is that "they wanted to get something into the marketplace as soon as possible to establish their position," especially since STSC got its nested-arrays extension out first, Crick said.

Issco to Follow ISO Standard

SAN DIEGO — Issco has announced that it will release graphics software compatible with a standard recently proposed by the International Standards Organization (ISO).

According to Issco, the ISO standard differs significantly from a previously considered "core" proposal from the Association for Computing Machinery's Special Interest Group in Computer Graphics. In particular, the ISO standard is said to avoid the "current position" approach considered by many to be an anachronism and has a more modern approach to graphics interaction.

Peter Preuss, president of Issco, said the new ISO option will be a fully integrated part of Issco's Disspla and Tell-A-Graf software products.

The proposed ISO standard was discussed recently at a National Computer Graphics Association meeting in Anaheim, Calif.

Dr. Peter Bono, vice-president of product development for Athena Systems, Inc. in Pawcatuck, Conn., explained that the Graphical Kernel System (GKS) was accepted as a draft international standard at an ISO meeting held in June in Eindhoven, the Netherlands. As chairman of the American National Standards Institute X3H3 Committee, Bono led the U.S. delegation in the Netherlands.

U.S. technical objections to the proposed ISO standard were resolved at the June meeting, and Bono's delegation then decided to vote positively on GKS. After further editorial change, the revised standard will become an international standard. "I fully expect that we will vote eventually to adopt it as a U.S. standard. I personally will be working toward that," he added.

The extensions to the APL operators are said to include user-defined operators, use of defined functions with operators, new operators designed to improve the usability of general arrays and extensions to existing operators to eliminate previous restrictions.

According to IBM, additions to the APL primitive functions include a picture format to improve report preparation facilities, extensions to the grade function to allow sorting of both alphabetic and numeric data, new functions for text and string handling and mathematical functions, which extend the power of APL in numeric computations.

APL2 is written in assembler and only object code is being provided,

an IBM spokesman said. It requires VM/System Product (SP), and the use of Ascii-coded terminals requires VM/SP Release 2.

The APL2 product is not considered a replacement for VS APL, according to IBM, and none of the workspaces shipped with VS APL are provided with APL2. Users who require access to those workspaces will require a VS APL license.

Changes to VS APL workspaces and auxiliary processors may be required for operation under APL2, the vendor noted. In addition, the APL-based information center products are not supported for use with APL2.

Crick said that the key to the relevance of IBM's APL2 will be its similarity to STSC's product. "If they can

be treated as one language, it will essentially establish a new standard for APL and the language will move forward very rapidly," he said. However, if there are too many differences between the two APL versions, these variances, coupled with the other available versions of APL, will not be good for the language, he added.

Herb Gepner, software analyst for Data Decisions, Inc. in Cherry Hill, N.J., suggested that the release of APL2 puts IBM more firmly back in the remote processing business. "They have got to have it to situate themselves in that marketplace."

The initial license charge for APL2 is \$1,950. The monthly charge is \$650, IBM said from 1133 Westchester Ave., White Plains, N.Y. 10604.

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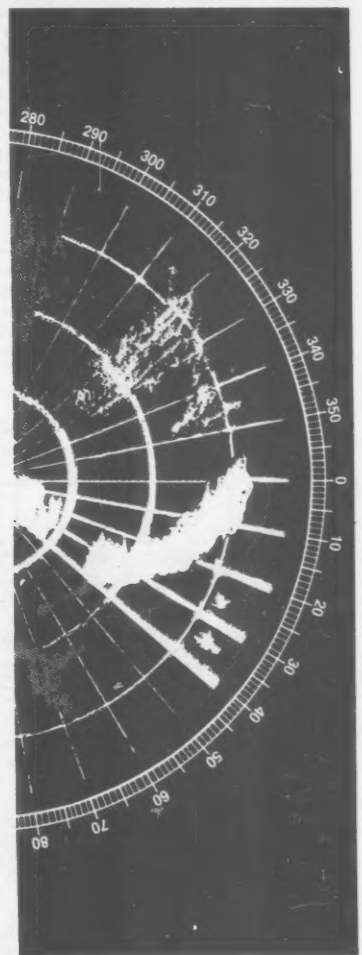
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Burroughs May Settle \$160 Million User Suit

(Continued from Page 1)

which the Medical College originally contracted.

In its complaint, the Medical College contended that Burroughs breached its agreement for the hospital system "despite express and implied warranties." The college claimed that Burroughs failed to deliver various and complete software modules, software "reasonably free of errors," properly coded data bases and various applications modules including personnel, fixed-asset management and pharmacy modules.

In addition, the college said that Burroughs "failed and refused to provide the professional and support services" of a contract to which both parties agreed. The complaint alleged that Burroughs did not make its BHIS software system operable, did not provide or service an accurate patient accounting system, did not provide timely programming and did not provide user training.

It also charged that the vendor failed to utilize its talent in correcting problems within the BHIS system and failed to provide technically capable people of doing the necessary work.

Lost Business Charged

As a result of Burroughs' alleged breach of contract, the college said in its filing that it had lost business as the purchasing agent of a Joint Medical Computer Center (JMCC), a management entity that was set up to

supply computer services to the college, the Good Samaritan Medical Center, Inc. and the Kurtis R. Froedtert Memorial Lutheran Hospital, Inc. The complaint stated that because of Burroughs' breaches, the Good Samaritan's business was lost and the college was prevented from obtaining the participation of other health-care providers for the JMCC.

Compensatory damages in the sum of \$40.8 million are being sought

from Burroughs by the college, which maintains that it was deceived by Burroughs' representations concerning the purchase of the computer system and support services. It further demands \$120 million in punitive damages.

A spokesman for Burroughs was unable to give details on the specific hardware at issue. He would only comment that "the litigation was brought by the plaintiffs because of a

technicality relating to the state statute of limitations. We do not believe that any damages will ultimately be proven and the parties are now engaged in negotiations to see if it can be resolved by settlement."

The attorney for the college, Michael R. Wherry, confirmed that negotiations for an out-of-court settlement were proceeding, but said that neither he nor his client had any other comment at the time.

Newspaper Lukewarm About SQL/DS

(Continued from Page 1)

vertising department on such items as current revenues, current lineage and ad sales. The advertising people can query the system by accounts, type of advertiser and type of product and are utilizing the system to write reports.

Although SQL/DS has performed as well as Gude expected it to and "provides us with a temporary solution for a specific problem," she is skeptical about making a long-term commitment to it. One problem with SQL/DS, she said, is that it requires a lot of hardware resources to run.

"You need a very powerful mainframe if you have a large data base — and ours isn't that large," Gude said. When only one person is using the system, the response time is fine; but that is usually not the case at the newspaper, she pointed out.

The Orlando Sentinel uses a 3M-byte

IBM 4331 Group 2 mainframe running under DOS/VSE. When it found it needed a query language that was accessible to users in the advertising department, it looked at Pansophic Systems, Inc.'s Easytrieve, but considered it too difficult.

The newspaper also looked at Software AG's Adabas and Cincom Systems, Inc.'s Total, Gude said, but "SQL/DS was the cheapest way from a software standpoint because we wanted to try a query language with a relational data base."

The Sentinel already had IBM's DL/1 DBMS and wanted something more versatile and user friendly. "We'd been searching for some kind of query language for three or four years," Gude recalled, adding that she be-

lieves it was the newspaper's sales force that first heard of SQL/DS.

The training involved in implementing SQL/DS consisted of an IBM users manual and a series of user tables. "We sat down with the people from advertising and took them through the manual... it took about 25 hours," Gude said.

Gude said that IBM's support of the new product has been "pretty good." While the local Orlando office is not terribly familiar with SQL/DS, "because it's a new product, there's nobody who is," she added.

Asked if she would recommend SQL/DS to others, Gude said that would depend on how the software would be used, pointing again to the problems with the response time.

She's Networked Since '49

(Continued from Page 1)

General Electric Co., University Computing Co. (UCC) and finally to his own firm, Scott Instruments.

Batchelor does not have a programming background and insists she has never wanted one. However, she joined Chance Vought Aircraft as a secretary after graduating from a 10-month business school program and began working with some very early pieces of computer equipment — the Selectronic Accounting Machine and 502 Electronic Calculator from IBM.

"In those days, when you talked about computer science, aircraft companies were one of the leaders in the scientific-computer type of application," Batchelor recalled. Working in this environment, Batchelor received her training on some of the first computers that were developed.

Her abilities were quickly recognized, and Batchelor went on to manage the firm's engineering computer department for 13 years. Subsequently she was hired by another ex-Chance Vought employee to manage GE's Chicago-based information processing center.

Scott had meanwhile moved to Phoenix, Ariz., where he was working for GE in its computer department. After several years, he hired Batchelor as a consultant and trainer for customers with large-scale computers.

When Scott moved back to Dallas to work for UCC, he brought Batchelor and some others with him to run another service bureau, the firm's utility network operation. She remained with UCC for about five years, until Scott's retirement prompted her exit. The two went into apartment management for six years.

At this time, Scott and his son con-

ceived the idea of forming their own firm. Once again, Batchelor was swept along with the momentum. Scott Instruments was founded in 1976 to conduct research and develop devices for the profoundly hearing-impaired. It has progressed into the development of voice-recognition systems.

Theory of Work

As vice-president of operations for the growing young firm, Batchelor has put into action her theory of work: "My main goal is to get the job done, whatever it requires." She initially did all the secretarial work, bookkeeping and shipping and receiving.

Now the company has "kind of grown from under me," she noted. It now employs about 30 people.

The firm is in the initial stages of developing its computer network, which currently consists of microcomputers. However, a Digital Equipment Corp. VAX-11/750 is on order.

Batchelor always has been surprised by the lack of women managing large-scale computer operations. "When I first started, I really didn't know it was unusual. I not only managed the operations, but I used all women, which also was unusual," she added. "I still think that, generally, women are more organized and more methodical and thorough about the tedious part of the job."

Batchelor said she really has not experienced sex discrimination. "I was always very fortunate in that I worked with really good people and for really good people." Her feeling is that people do not care if you are male or female, as long as you do a good job.

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Halt Programs If Users Don't Pay

Software Developers Planting 'Booby Traps'

By Susan Blakeney
CW Staff

More than one clever software developer has found the solution to the "check is in the mail" syndrome.

Both to collect payment for software and to guard against piracy, software companies and independent programmers alike are planting "booby traps" in their programs that can bring them to a grinding halt.

The "booby traps" can take either of two forms. The first method involves implanting in the software a clock or timing device that goes off after a certain amount of time has elapsed, causing the software to stop executing; the second is the recurring code method, which stops all processing after a certain sequence has been repeated a predetermined number of times.

In either event, the user must contact his programmer or software house to learn how to get on-line again.

American Integrity Systems, Inc. (AIS) in Santa Ana, Calif., a microcomputer firm, is using the software booby traps both to protect its dealers from bad debtors and to keep clients from copying the software onto another system. AIS uses the "internal clock" methodology in its accounting software, set to "go off" at 30 days.

If the software is prepaid, the program goes out with a code already in

it that keeps it from stopping. However, a client that does not prepay for the software must obtain the code from the dealer, either via a visit or a telephone call, or the system will crash after the allotted 30 days, AIS' Mike Fowler explained.

According to Fowler, users do not know why their systems crash. They receive error messages on their systems instructing them to "Call Your Dealer." If the user pays up front, on the other hand, "They never know [the booby trap] is there."

To safeguard against software pirates, AIS has also bugged its software with a registration number that

corresponds to one client only. Once the software is programmed for a specific user, "the program is permanent," Fowler claimed.

Grid Systems Corp. of Mountain View, Calif., is another microcomputer company that is experimenting with the booby trap concept, although it has yet to be implemented. The company can install a clock/calendar chip in its turnkey systems, allowing it to enter "an expiration date when we download our programs," Barry Margerum, director of marketing communications and sales support at Grid, said. Margerum emphasized that while the company "has

the capability" to booby-trap client software, "whether or not we choose to use it remains the question."

Grid also encodes its software with a tracking number so that it is almost impossible to use if copied illegally. Each customer of the turnkey company is assigned a number that is implanted in its operating systems; each subsequent piece of software purchased by the client is encoded with the same number. If the encoded program number does not match the one in the operating system (as is the case when software is copied), the program will not run.

(Continued on Page 8)

Halt Programs If Users Don't Pay

Placing "booby traps" in software programs may make bill collecting easier and help stop software piracy, but there's a flip side to the coin: A disgruntled programmer can use the same methods to sabotage his employer, causing software snafus long after he has left the company.

How can companies defend themselves? Donn Parker, senior management systems consultant at SRI International, Inc. in Menlo Park, Calif., said that software sabotage has been made "a serious crime in the 17 states that now

have computer crime laws." To be on the safe side, Parker offered the following advice to security and DP managers:

- Establish a code of conduct at the company spelling out what is and what is not authorized activity. The code should point out all criminal laws and state that the company will prosecute violators.

- Attend "management sensitivity training" sessions to become more aware of any personal problems in the shop.

- Use informal, well-placed contacts throughout the shop.

- Establish individual task functions and a system of checks and balances to always keep the staff slightly on guard.

- Develop strategic employee termination policies, incorporating exit interviews to minimize bad feelings and disruption. Parker urged managers to go so far as to "send the employee to Bermuda for a couple of weeks" to keep him away from other employees and the equipment and to change the terminated employee's attitude from negative about the company to positive.

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IBM Upgrades Two MCCUs, Enhances 3814 Switching System

RYE, N.Y. — IBM has announced two upgraded versions of its multi-system channel communications units (MCCU) that are said to control the transfer of data between loosely coupled processors located up to four times farther apart than with previous IBM models.

At the same time, it also unveiled an enhancement of its 3814 switching management system.

The Model 3088 MCCUs are stand-alone, microprocessor-based devices that are designed to interconnect IBM 4341, 30 series, 3042-2 attached processor and 3081 channels while reportedly maintaining compatibility with existing channel-to-channel adapter features. The Model 1 MCCU can link four processor channels and provides up to 126 channel-to-channel paths; the Model 2 connects up to eight channels and offers as many as 252 channel-to-channel paths.

Both models transfer data at speeds up to 3M char./sec. Processors can be located as far as 800 feet apart, which is up to four times the maximum separation possible with current IBM channel-to-channel adapters, an IBM spokesman said.

Improved Features Offered

The MCCUs also offer improved diagnostic and service features, including automatic error detection and fault isolation, he said.

The Model 1 costs \$95,000, while the Model 2 is priced at \$145,000. Shipments are scheduled for the second quarter of 1983.

Enhancements to the Model 3814 switching management system include support for more displays and printers, an increased capability to

store and activate system configurations and the ability to link a second switching system to act as a backup.

Up to two IBM 3278 Model 2 display stations can be used as operator consoles with the enhanced system, the spokesman claimed. With these terminals, operators can display selection menus, audit trail data and entry and command panels.

Users can also attach as many as three IBM 3287 Model 1 or 2 printers to provide a record of stored configurations, configuration change data or switching operations, he noted.

The enhancements reportedly allow users to store as many as 464 crosspoint, or channel group, configurations. This compares with only 78 such configurations with the current 3814. In addition, up to 327 two-channel switch (TCS) configurations, defining the setting of all switches on a control unit such as an IBM 3880, can be stored in the 3814. Previously, seven TCS configurations could be stored, the spokesman said.

The enhancement also allows users to attach a second 3814 on the same system loop to be used as a backup device.

The enhancements that allow users to attach additional display stations and printers or use a second 3814 device as an alternate cost \$1,990 each. They can be rented for \$85/mo or leased for \$68/mo each.

The expanded storage enhancement costs \$4,800. However, it can also be rented for \$200/mo or leased for \$160/mo under a four-year agreement.

Deliveries are scheduled for the first quarter of 1983, the IBM spokesman said.

Computer to Pit Koufax Against the Sultan of Swat

(Continued from Page 1)

some buddies at the St. Louis-based BFV&L Promotions, Inc. has turned into a 160-hour project involving three people and an Apple Computer, Inc. Apple III personal computer. Weber and his friends were wondering how the great players of the past would fare against modern competition.

A couple of weeks later, they were working on a project requiring statistical data to formulate different situations and, *voila*, the two projects collided. "We said, 'Wait a minute, wouldn't it be neat if we could do what we're doing here with baseball?'" Weber recalled. "So then we started pursuing the idea."

They sought out the historical information they needed from the archives of *The Sporting News* and decided to judge each player on his five best statistical years. The end result was 2M bytes of Apple Pascal data stored on a Winchester disk drive.

"We tried to create as realistic an environment as we could by getting as broad a statistical base as was feasible," he said. From there they developed a program that would give the most realistic outcome based on the statistics.

Even the most diligent baseball aficionado may be hard-pressed to remember Philadelphia's Schibe Park but, as Weber explained, it is historically appropriate. Formerly known as Connie Mack Stadium, Schibe has housed teams from both the American (Philadelphia Athletics) and National (Philadelphia Phillies) Leagues. The park was also a suitable venue because its symmetrical shape gives no advantages to left-handed or right-handed hitters.

No Bases Left Unturned

BFV&L left no bases unturned in its quest for realism. For starters, it hired veteran sportscasters Jack Buck and Lindsay Nelson to call the game based on the computer readouts. It also spent the first few months of the current baseball season recording sound effects at a host of big league ball parks to back the announcers. Finally, it asked the fans to vote on starting lineups.

The response was impressive. More than 116,000 fans cast ballots, which were distributed by radio stations and *The Sporting News*. The top voter was none other than The Yankee Clipper, Lou Gehrig.

In a contest that required a recount, former Yankee Phil Rizzuto, who now broadcasts Yankee games, beat out ex-Boston Red Sox Luis Aparicio by 15 slim votes. Holy cow.

Buck and Nelson actually called the "game" on June 21. Weber made sure that neither the announcers nor anyone else would know the eventual outcome by manufacturing multiple endings. That means only an inner sanctum of Weber and four others have that knowledge.

"We didn't want the final score known, and we didn't want Jack and Lindsay besieged as obvious people who would know the final outcome," Weber said.

What we do know is that weather conditions for the game were ideal,

runs were scored in at least four innings, the final score was a close one and a capacity crowd of 32,408 packed old Schibe Park for the event. Total elapsed time was two hours and 35 minutes.

Casey Stengel managed the Americans and John McGraw the Nationals. According to Weber, they were selected for their colorful personalities. The umpires were Tom Connolly, Jocko Conlon, Bill Klein and Bill McGowan, a pugnacious lot if ever one existed. Disappointingly, Weber predicted no colorful rhubarbs.

The starting lineups in batting order:

American League: Phil Rizzuto, shortstop; Ty Cobb, center field; Ted (The Splendid Splinter) Williams, left field; Babe Ruth, right field; Lou Gehrig, first base; Rod Carew, second base; Yogi Berra, catcher; Brooks Robinson, third base; and Whitey Ford, pitcher.

National League: Pete Rose, first base; Mike Schmidt, third base; Stan Musial, right field; Henry Aaron, left field; Willie ("Say Hey") Mays, center field; Rogers Hornsby, second base; Honus Wagner, shortstop; Roy Campanella, catcher; and Sandy Koufax, pitcher.

Vendors Plant Software Traps

(Continued from Page 7)

According to reports in the general press, William England of England Software in Washington, D.C., also ascribes to the above methodologies. Because he suspected that a customer would not pay, he encoded a software "time bomb" in an environmental control program he developed for the client's Digital Equipment Corp. PDP-11. If payment was not made in the agreed upon 30 days, the booby trap would automatically stop the system from running.

Although England had warned the client, "the guy didn't believe me — he kept promising me a check, but it never arrived," he said, according to a report in the May 31 issue of *Business Week*. The software time bomb went off, shutting down the customer's heat and air conditioning and water-temperature-control systems. "He telephoned, frantically screaming at me because the program wasn't working and he was losing \$3,000 a day because of it," the *Business Week* report continued.

After the client made good on his debt, England restarted the program. "If I weren't clever, I would have been stuck — not him," England reportedly said.

England is working in Moscow and could not be reached for further comment.

Correction

In the Micronotes section [CW, June 21, June 28], the incorrect address was used for Condor Computer Corp. The firm is located at 2051 S. State St., Ann Arbor, Mich. 48014.

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Congress Gives Approval To Small-Firm R&D Bill

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — Congress has completed action on the Small Business Innovation Development Bill, which mandates a 1.25% set-aside for small companies of the research and development budgets of most of the largest federal agencies.

Final approval of the legislation came June 29 after the Senate agreed to accept amendments to the bill made by the House of Representatives when it passed the measure one week earlier [CW, July 5].

The bill had been unsuccessfully opposed by the American Electronics Association, which argued the mandatory set-aside would be an unnecessary, additional layer of federal bureaucracy for the government's R&D programs.

CSC to Appeal Decision Reinstating Fraud Charges

WASHINGTON, D.C. — Computer Sciences Corp. (CSC) said it will appeal the recent decision of a federal appeals court in Richmond, Va., to reinstate a federal indictment charging the firm with fraud in connection with a large government DP services contract.

The company will be seeking a rehearing by the full appeals court on whether last year's dismissal of the indictment should be reinstated. A three-judge panel of the court reinstated most of the 1980 indictment against the company, several former and present CSC employees and a subcontractor on June 16 [CW, June 28].

The indictment resulted from allegations concerning CSC activities in obtaining and billing for a contract between the government and the firm's Infonet Division, which provided the bulk of federal agency teleprocessing services between 1972 and 1977.

Federal Agencies Issue Studies, Reports on DP

WASHINGTON, D.C. — Various federal agencies have recently announced the availability of several reports and studies of interest to the DP community:

- The National Telecommunications and Information Administration has published a primer entitled "The Discreet Logarithm Public Cryptographic System," which presents the required mathematics for such systems. The system's resistance to cryptanalysis is considered and advice is provided on architecture of system implementation and the tools that may be used, the agency said.

The report, No. PB 82-130097, is available for \$7.50 from the National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22161.

- A data base of information about existing computer software tools, compiled over a three-year period, has been analyzed by the National Bureau of Standards (NBS) in terms of tool classes and characteristic features.

Published as "Software Develop-

ment Tools," the data base includes information on the availability, capabilities, limitations and applications of more than 360 software tools. Trends in the development and use of software tools are analyzed and discussed, the agency said.

The report is available for \$6.50 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, order No. 003-003-02389-2.

- A survey of software validation, verification and testing (V,V&T) procedures at five government and five commercial sites has been conducted for the NBS by a Boeing Computer Services Co. team.

NBS said study investigators found

Washington Update

"a general lack of awareness of V,V&T concepts and principles and only sparse and informal applications of V,V&T practices."

"A Survey of Software Validation, Verification and Testing Standards and Practices at Selected Sites," No. PB #82-209172, is available for \$13.50 from the National Technical Information Service, Springfield, Va. 22161.

GAO Slams Army Corps For Poor DP Planning

WASHINGTON, D.C. — The Army Corps of Engineers has been criticized by the General Accounting Office (GAO), the congressional inves-

tigating agency, for "weak planning and control" of the Corps' information resources.

Charging the Army agency with "ineffective and inefficient management, acquisition and use" of those resources, the GAO said the Corps' major hardware replacement program is experiencing costly delays because of inadequate management.

Noting that program has an estimated life-cycle cost exceeding \$1 billion, the congressional auditors recommended a more comprehensive planning process and a formal oversight mechanism for the Corps' DP acquisitions and use. The Corps answered the GAO report by saying it agreed in general, but disagreed on some details. The Corps also indicated it has begun making some of the management changes suggested by the GAO.

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Filing Gives Details on ABI BOCs to Continue Terminal Support Until '84

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — Although American Bell, Inc. (ABI) — the subsidiary recently formed by AT&T to offer unregulated products and services — may begin marketing new business terminal equipment next January, maintenance and relocation of in-place systems will continue to be handled largely by Bell operating companies until July 1984. ABI will take over these chores after that date.

This was one of several operational details discussed in a capitalization plan for ABI that the phone company recently filed with the Federal Communications Commission (FCC).

Historically, Bell terminal products and many of its communications services have been marketed by the Bell operating companies under tariff.

Under AT&T's recently filed plan, however, the Bell operating companies will continue to market new terminal equipment only until their equipment inventories, as of next Jan. 1, are exhausted.

"Computer II"

Formation of ABI was precipitated by the FCC's 1981 Second Computer Inquiry Decision — generally referred to as "Computer II" — which inaugurated the policy of marketing terminal equipment as well as "enhanced" (computer-based) services on a deregulated basis.

As part of this same decision, AT&T was told that it could market such items only through a "fully separated" subsidiary.

The legality of the FCC decision is now being contested by the Computer and Communications Industry Association (CCIA), as well as other groups in a case being tried here before the U.S. Court of Appeals.

According to the capitalization plan that AT&T filed with the FCC, ABI's basic mission is to market terminal systems and computer-based products and services to business and res-

idential customers. Its national marketing headquarters will be in New Jersey.

Related engineering, design and development work will be performed in-house at facilities located in New Jersey, Colorado and Indiana.

"Certain other engineering, design and development services will be provided by Bell Telephone Laboratories," the company reported.

"The development of custom-designed integrated circuits" was cited as an example of the work that ABI expects to farm out to Bell Labs.

ABI business systems products will be purchased from Western Electric

Co. at "compensatory prices," AT&T said, adding that Western Electric may also sell such products on its own.

Furthermore, Western Electric will be free to "distribute, install and repair the products it sells to American Bell; provide engineering, design and development services; and license its technology," in accordance with Computer II requirements.

AT&T Proposal

AT&T is proposing to invest \$4.7 billion in cash and equipment in ABI by 1985. The first contribution, due Jan. 1, will involve the transfer of as-

sets worth a total of \$158 million. The assets — buildings, land, machinery and furniture — include \$34 million in computer equipment.

Bell operating companies will supply \$88 million, while Bell Labs will supply most of the rest.

In addition, AT&T will provide a short-term \$8 million loan and Western Electric will contribute a consumer products inventory worth another \$8 million.

The second capital infusion — amounting to \$280 million — is due July 1, 1984 and will be used to "provide for installation and maintenance of all Bell system business [terminal] systems," the company said.

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WIP Speakers To Talk on Bell

WASHINGTON, D.C. — Anne P. Jones of the Federal Communications Commission (FCC) and Louise Lynch, chief executive officer of Courtesy Associates, will address the Washington Forum of Women in Information Processing (WIP), slated to take place here on July 22.

The two women will address the subject of AT&T's change from a utility to a competitive supplier; the role of the FCC in controlling growth and change in the communications industry; the significance of the Second Computer Inquiry Decision, which called for the deregulation of all customer premise equipment and a wide range of enhanced services; and how these issues impact the consumer.

Preregistration for this event is \$15 for WIP members and \$30 for non-members. Further details can be obtained from the WIP Seminar Series, 1000 Connecticut Ave. N.W., Washington, D.C. 20036.

Terrorism Vexing International DP Crime Experts

By Jim Bartimo
CW Staff

LOS ANGELES — Smuggling, terrorism and sabotage by computer are a few of the potential crimes currently worrying experts in international computer crime, according to Jay Bloombecker, director of the National Center for Computer Crime Data.

If a computer criminal accessed a French computer from the UK and instructed the company to transport inventory to Brazil where he could claim it, which country would prosecute him if he was caught?

The answer is that there would be considerable confusion because of the state of international extradition laws, Bloombecker said in a recent interview, but the UK would most

likely be able to prosecute. So the criminal could conceivably select the nation with the most lenient computer crime laws from which to access another country's computer.

Terrorists with data communications expertise could pose another problem. "It strikes me as unlikely that bombs will be the way to sabotage computers," Bloombecker said. "The motivation to use computer knowledge against the establishment is there. Terrorists will find the computer an attractive target. We haven't handled terrorism very well in the past and this won't get any better with the introduction of the computer."

As the number of people with computer knowledge increases, so will

the incidence of international computer crime, especially crimes using remote-access terminals. High-technology theft and data piracy are other problems that could become commonplace as the users of remote terminals "capitalize on national boundaries," Bloombecker said.

100,000 Sites

"There are more than 100,000 computer sites in the U.S. and Western Europe alone that are constantly talking to one another — transferring funds, transmitting critical data and sensitive personal and diplomatic information," according to Barry Schrager, president of SKK, Inc., a systems software and consulting firm. SKK co-sponsored with Ra-

cal-Milgo, Inc. a conference on international crime titled "Operation Safeguard."

"In addition to main computer sites, there are several million computer terminals with the ability to access mainframe computers," Schrager said. "The opportunity for computer crime is, therefore, enormous."

The first step in eliminating this opportunity is to look at the kinds of crimes that are being committed now, Bloombecker said. The next step is to create a model law that can be applied internationally.

The National Center for Computer Crime Data has worked with the international police agency, Interpol, and local police forces to encourage the creation of a model law. Unless extradition laws are improved through an agreement made among nations, computer crime will rise as quickly on an international basis as it has in the U.S., Bloombecker said.

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Expert Identifies Crime Scenarios

LOS ANGELES — There are seven scenarios for international and localized computer crime, according to Jay Bloombecker, director of the National Center for Computer Crime Data. Identifying the types of crimes that occur nationally and internationally is the first step toward stopping them, he explained in a recent interview (see story above).

The scenarios include:

- **The Playpen** — When a computer crime is committed as the result of an experiment by a mischievous computer expert. This type of offense is often seen in colleges where students may tap into a file containing grades, Bloombecker said.

- **The Cookie Jar** — This is, perhaps, the most common scenario — found when someone is in need of a large sum of money and has access to a computer handling the accounts of a company.

- **The Land of Opportunity** — Even when there is no financial need, a computer expert may be tempted by the ease with which he may extort funds.

- **The War Zone** — A computer operator who feels that his employer has cheated him in some way may take revenge by sabotaging the company's data.

- **Fantasyland** — There are times when the person committing a crime is not totally aware of what he is doing. Through the influence of someone more knowledgeable, computer operators have been tricked into aiding criminals.

- **The Toolbox** — A computer is as valuable a business tool when the commodity is drugs or other illegal inventory. Bloombecker believes that a more sophisticated crime ring may use a computer as a means to more efficient law-breaking.

- **The Soapbox** — When a terrorist group or other organization has a point of view it wants to receive public attention, it may sabotage a computer instead of kidnapping the head of the company.

Computerized Editing Cuts Costs of Publishing Thomas Jefferson's Papers

I am not afraid of new inventions or improvements, nor bigotted to the practices of our forefathers . . . Where a new invention is supported by well known principles, & promises to be useful, it ought to be tried.

— Thomas Jefferson

By Marguerite Zientara
CW Staff

PRINCETON, N.J. — The inventor and scientist Thomas Jefferson would doubtless have approved of the computerized editing of his political papers using a method expected to save \$12,000 per volume in production costs.

The project was begun in 1943 as part of the Jefferson Bicentennial Celebration. Proposed by historian Julian Boyd, editor of the papers for 40 years at Princeton University, the project moved slowly after the 1950 publication of the first volume of Jefferson's papers.

By 1980, when Princeton historian Charles Cullen took over after Boyd's death, only 19 volumes had been printed. Volumes 20 and 21, due this summer, will bring Jefferson's edited correspondence up to the year 1791, when he served as George Washington's secretary of state. Besides more than 50,000 letters to and from Jefferson, the papers consist of other documents that together are expected to fill some 65 volumes when the project is completed sometime early in

the 21st century.

Part of the reason Cullen was chosen to fill Boyd's position was his growing familiarity with computers. At the College of William and Mary in Williamsburg, Va., Cullen had used an IBM 370 processor to compile a cumulative index for the papers of Chief Justice John Marshall, the man who established the precedent of judicial review of the Constitution.

At Princeton, a bisynchronous communications line connects an IBM Series/1 and a Model 3081 computer. "Ninety percent of the time we actually work in the Series/1 on files that are stored on disk," Cullen explained, noting that about two volumes of material, or about 1,400 pages, can be stored on a disk.

Through this equipment, there are three methods of operation available to the scholars. "We can either send a file from the Series/1 to the 3081, or we can receive a file from that mainframe, or we can use 'pass-through' to pass through the Series/1 to work directly in the mainframe emulating a 3277 full-screen editing terminal,"



Historian Charles Cullen, working beneath a bust of Thomas Jefferson, is using an IBM Series/1 linked to a 3081 in his 25-year project of editing Jefferson's papers.

Cullen explained.

Cullen enters and edits text via an IBM 4978 terminal. Using the University of Waterloo's Script software — "an excellent formatting program," according to Cullen — the 3081 then arranges the material exactly the way he wants it to appear on the printed page.

The Series/1's "very new" Text Entry & Edit program "still has a bug in it that's really driving us crazy," Cullen said. "The programmer who wrote the program for IBM is trying to correct the problem now."

In the meantime, the program "doesn't end properly," according to Cullen. "The bug is in the Receive part of the program that enables us to receive files from the mainframe into

the Series/1. The program drops off the last block of data, which is of course a nuisance, because when we receive programs we have to put a fake block of data at the end of each file.

However, "when it works, it works beautifully."

What exactly takes so long? Basically two things, according to Cullen: "ensuring the accuracy of the transcription we make from Jefferson's handwriting, . . . which might involve looking at an enlarged portion of a letter to see it more clearly or looking at the originals in the Library of Congress, and the research necessary to annotate the documents to explain things that are mentioned in them."

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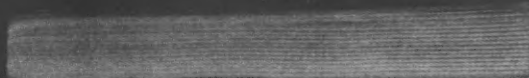
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Houston Agency Stops Paying for Its 370/138

HOUSTON — Because of a 20% cut in subsidies by the U.S. Department of Housing and Urban Development, the Houston Housing Authority (HHA) has not made a payment on its IBM 370/138 mainframe since last December.

The funding cut is the primary reason why the HHA can no longer meet its monthly \$10,000 payments, according to newly appointed HHA Board Chairman H.J. Tollett Jr. However, sources close to the HHA argue that regardless of payment, the equipment is underutilized.

The equipment was originally ordered from IBM in 1978. When

IBM could not deliver the computer fast enough, it was purchased in 1979 from a local supplier, Computer Sales International, Inc. (CSI), to maintain the HHA's financial records and rent subsidy payment schedules. Since then, every member of the HHA board has been replaced or resigned "for no particular reason," Tollett claimed.

Although the board has changed, a financing contract for the equipment with E.F. Hutton Co. remains in force. The contract calls for the agency to make payments totaling \$688,400 when the contract expires in February 1985, according to E. Richard Makowski,

a spokesman for E.F. Hutton.

Although in recently published reports Makowski has been critical of the HHA's decision to suspend payment for the equipment, when contacted recently he would make no comment pending negotiations with the new board.

In addition to not meeting the payment schedule with E.F. Hutton, the HHA has no computer-trained personnel to operate the data processing department properly, according to a report published in the *Houston Post*. "I have no doubt it was the machine for them [HHA]," Al Smith of CSI said, "but they can't run it with two people."

Plans to obtain a new computer system are in the works. "We're starting from scratch," Tollett said.

Tollett agreed that there is a personnel problem in the HHA, but said he is too new in his position to predict any changes. The agency's acting executive director, Joy Fitzgerald, would make no comment on the board's history or the use of the computer.

Why has the HHA stopped paying for the system? "The funds are not available," according to Tollett. "That thing costs too much. It costs us \$400,000 per year when you include software, maintenance and other costs."

Student Gets Fine, Probation For DP Scheme

By Susan Blakeney
CW Staff

PHILADELPHIA — Daniel J. Smith's let's-make-a-deal scheme won him a \$300 fine and two years of probation after he offered to bypass security checks in Philadelphia's Office of State Inheritance Tax computer system — for a price.

The Princeton University co-op student said he was "bored" working part time at the State Inheritance Tax Bureau last summer when he decided to write to five lawyers offering a 50-50 deal. According to the deal, Smith would use the department's computer system to reduce or mark "paid" the tax records of the lawyer's client.

The payoff, according to court records, would have netted him approximately \$5,000.

But "Smith was promising something he could not have delivered," Richard Papiernik, press secretary for the Department of Revenue, said. Taxes are not paid directly to the Office of State Inheritance Tax, but go through the Department of Wills first.

Smith "had a minor position — he was not even involved in the money collecting end," Papiernik contended. "He did not have access to the main computer ... All he did was check statistics on tax collection."

Smith did have access to a terminal in his work area, Papiernik said, but he worked primarily on computer printouts and could not access the department's main files on an IBM 3033 mainframe. "Not only would he have had to access our main file, but he would have also had to change the numbers on a report from the Registry of Wills Office that matches up debts and payments."

Smith was caught when Paul Bartle, one of the lawyers to whom he wrote, turned his letter over to his brother, Harvey Bartle, then Pennsylvania's attorney general, who launched an investigation.

On March 11, Smith pleaded guilty to charges of bribery and obstructing administrative justice. Presiding Judge Anthony Scirica ordered psychiatric treatment as part of the plea bargain agreement.

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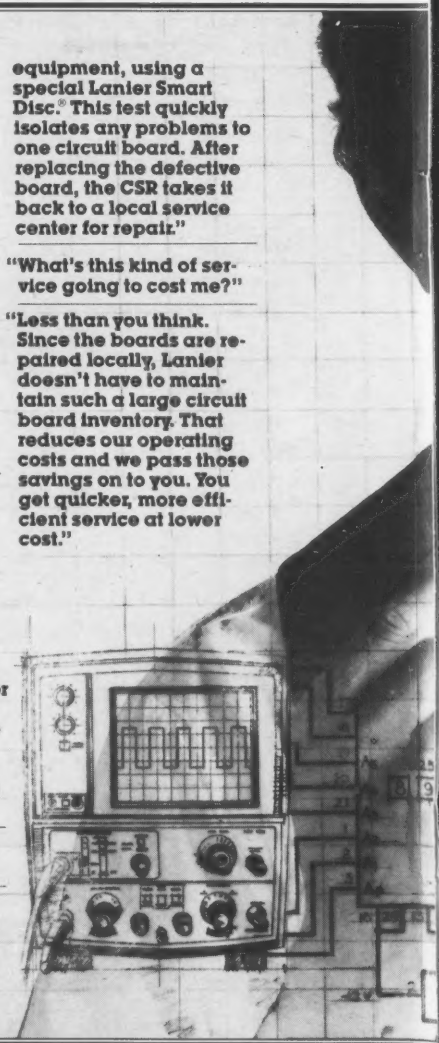
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For Zip Code, Electronic Mail Services

Independent Evaluation Chides Postal Service

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — An independent evaluation of the U.S. Postal Service (USPS) released last week chided the Postal Service for inadequate planning and management in introducing new technology, such as the nine-digit Zip Code and electronic mail services.

The study, performed by the National Academy of Public Administration, said that in light of the increasing availability of computer and telecommunications technologies, the USPS "should devote considerably more systematic attention to assessing its opportunities for develop-

ing new and responsive services." The academy is a 15-year-old non-profit organization established to study governmental problems and to advise public officials.

The evaluation report was not particularly laudatory of the way these new technologies have been introduced into postal operations and services to date. Of the Zip-Plus-4 program, which the academy called "an excellent step toward increased postal productivity," the report said: "Closer attention to potential public reactions and political attitudes will help USPS do better in ... paving the way for ... acceptance."

The report praised the USPS deci-

sion to begin offering electronic mail services, but suggested the agency should work to "improve its relations with the information industry and eliminate much of the misunderstanding concerning [USPS] intent."

The evaluation was undertaken at the request of the Postal Service to gauge its success at carrying out the mandates of the 1971 Postal Reorganization Act, which created the USPS as an independent government body. The 10-member evaluation panel included Dr. Ruth Davis, former director of the National Bureau of Standards Institute for Computer Sciences and Technology; Thomas Wands, former senior vice-president

for operations at Sears Roebuck & Co.; and Elmer Staats, former U.S. Comptroller General.

The postal evaluation panel found that in general USPS management since reorganization constitutes a "record ... of considerable achievement. USPS management has been aggressive and intelligent in tackling its problems through new methods, mechanization and training programs," the study concluded.

Looking to Future

However, looking to the future, the report said "planning, research and development in USPS have been deficient and should be substantially strengthened and improved." In the area of new technology, which threatens to supplant a portion of first class mail and diminish postal revenues, the Postal Service has not been diligent enough in tracking new services possibilities and measuring the future USPS market.

Turning to electronic mail in particular, the panel backed the recently established Electronic Computer-Originated Mail (Ecom) service. "USPS should make its plans for electronic mail services a high priority for early distribution and discussion" and work closely with Congress, regulatory agencies and the telecommunications industry to develop a widely acceptable Postal Service role in electronic mail, according to the academy.

USPS should "improve and diversify" its existing Ecom services, but should not attempt to offer point-to-point electronic message systems, the so-called "generation III services," the evaluation report said.

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SNA Meet Set For July 26-28

ROSEMONT, Ill. — Practical applications, benefits and pitfalls related to IBM's Systems Network Architecture (SNA) will be presented during a three-day seminar here July 26-28.

The seminar, "SNA Architecture and Implementation," will also be held in San Jose, Calif., Aug. 16-18; Boston, Sept. 13-15; and again in San Jose, Nov. 15-17.

The seminar is being sponsored by Communications Solutions, Inc., which said it is aimed at network designers, systems programmers, technical managers, product planners, systems analysts, operations managers, marketing managers and others involved with SNA.

Emphasis will be placed on examples of how various protocols are used in existing SNA products to control end-user-to-user communications. SNA's impact on the user's communications environment, its relationship with standards such as X.25 and the International Standards Organization's reference model and its implications for non-IBM communications product vendors will also be covered.

The fee for the seminar is \$650, Communications Solutions said from Suite 205, 10062 Miller Ave., Cupertino, Calif. 95014.

Robots to Dominate Manufacturing

ADL Gurus Explore DP's Industrial Impact

By Tim Scannell

CW Staff

CAMBRIDGE, Mass. — By the end of the decade, computers will dramatically shrink the size of the average factory and reduce overhead labor; turnkey robots will dominate industrial environments; and artificial intelligence will revolutionize the medical field.

By 1990, the majority of industrial robots will be leased rather than bought, and computers, machines and people will be linked together in "real time" to achieve higher work quality, less waste and shorter production runs.

These are some of the findings that

came out of a meeting last month of nearly 100 experts and analysts from Arthur D. Little, Inc. (ADL), a research and consulting firm based here. The industry and technical gurus traveled from various points of the globe to attend the firm's biennial forum that focused on the critical concerns and issues facing business and government leaders over the remainder of the 1980s. More than 200 executives from industry and government attended the four-day conference held at Boston's waterfront.

Significant Finding

One of the more significant — although predictable — findings of the

meeting is that computers will play an increasingly important role in the so-called factory of the future. Computers will not only cut down on direct labor, but will reduce white-collar indirect labor, which has seen rapid increases over the past 25 years, according to Thomas G. Gunn, managing director of ADL's Computer Integrated Manufacturing Group (CIM).

Gunn pointed out that many U.S. operations presently have from eight to 14 layers of personnel between the chief executive officer and workers on the shop floor. Computers — especially robots — will reduce that gap by replacing many of the middle

people and increasing the flexibility and flow of information between the bottom and top corporate rungs, he said.

Dr. Irvin Krause, an industrial specialist also with ADL's CIM group, echoed Gunn's views, adding that computer-aided design and manufacturing (CAD/CAM) systems will be more heavily used to direct programmable machinery and construct the final product. At the moment, most CAD/CAM equipment is used mainly in the design phase and has little to do with the last steps in the manufacturing process, Krause explained. In fact, while the U.S. first developed CAD/CAM and reportedly holds the lead in design technology, only 5% of the country's manufacturing tools are aided by computers. And many of these are imported from Japanese companies, the specialist maintained.

In addition, for all the ballyhoo about CAD/CAM, only 25% of its potential users have adopted it and very few are applying it properly, Dr. Leonid Lipchin, an ADL manufacturing specialist, said. CAD/CAM equipment is primarily used for automating routines and repetitive functions such as drafting and product design, he said. These actions even create "the undesirable side effects of more paperwork, more overhead and difficulty with job scheduling."

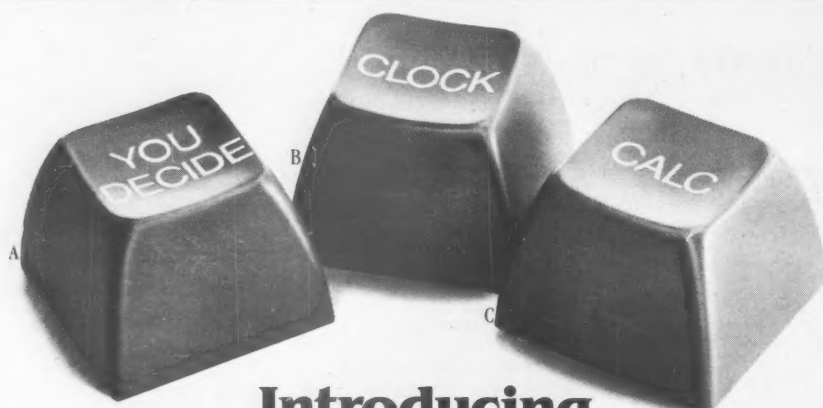
CAD/CAM's benefits on product cost and overall company performance really shine when the technology is used for product creation and the direction of the manufacturing process, he stated.

Focusing on robotics, Dr. Gerald J. Michael, a senior consultant with ADL's CIM group, forecast that the industry will soon see the evolution of robot leasing. In fact, by 1990 leasing industrial robots will account for a lion's share of the total U.S. robot market. However, this will only come with the development of high-level user-friendly robot programming languages to replace today's cumbersome techniques that teach a robot to do something by physically moving its parts, Michael noted.

ADL's research staff also exchanged ideas on a new technology that could revolutionize semiconductor manufacturing, and the effect computers will have on medicine.

Molecular beam epitaxy (MBE) is a technique that relies on ultrahigh-vacuum evaporation to grow single crystalline chip layers, not necessarily using traditional silicon. The crystal surfaces can then be coated with atoms and molecules to control the behavior of the electronic device. The technique could result in the development of devices that handle information up to 10 times faster than present silicon devices, Dr. Mehmet Rona, a senior physicist and director of ADL's recently completed MBE laboratory, said.

The medical profession will also benefit from the increased use of computers by using machines programmed to adjust their thinking and make decisions in response to new patient and physician information.



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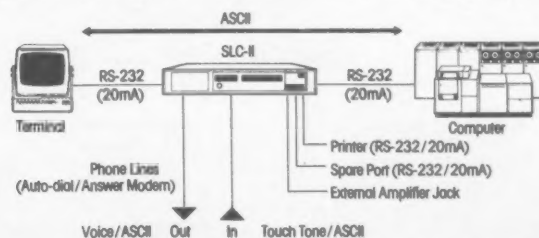
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Course Starts Aug. 9

Class to Examine CPU, I/O Capacity

SUNNYVALE, Calif. — A course on establishing the capacity of computer systems will be given here Aug. 9-13 by the Institute for Software Engineering. The institute is an international organization specializing in providing education, publications and research in the field of capacity management to the data processing management and technical communities.

The five-day course on "Establishing Computer Configuration Capacity," was developed to assist performance analysts, systems programmers, capacity planners and other technical staff members in assessing the CPU and I/O capacity of computer systems. The course presents a detailed methodology for assessing the effects of contention on a

variety of system components as well as the performance implications of combining and reconfiguring subsystems.

Attendees will be instructed on how to rate both CPU and I/O power in current and alternative configurations. Examples and exercises taken from actual case studies are an integral part of the course, a spokesman said.

The cost of attending "Establishing Computer Configuration Capacity" is \$895 per person, with group discounts available. More information is available from the Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

DG Meet Set For Aug. 30

WASHINGTON D.C. — The North American Data General Corp. Users Group Conference will be held here from Aug. 30-Sept. 2 at the Sheraton Washington Hotel here.

The conference will include a full slate of discussions and technical presentations by both DG and users of the firm's hardware and software.

More information on the users group conference is available from Kathy Hickey at Data General, 4400 Computer Drive, M.S. C228, Westboro, Mass. 01580.

ACM to Sponsor Ada Seminar From July 19-23

COLLEGE PARK, Md. — A five-day seminar on "Programming in Ada," sponsored by the Washington, D.C., chapter of the Association for Computing Machinery (ACM), will be given here July 19-23.

Dr. George W. Cherry, technical director of Language Automation Associates, will conduct the course.

Topics to be covered include a history and overview of Ada; the lexical rules and units of Ada; various Ada programs; task synchronization and communication; built-in data types — arrays and records; Ada's 11 simple statements; and Ada's six composite statements, according to ACM.

The cost of the seminar is \$300. Further details are available from Arthur Messenger at the Department of Defense Computer Institute, Washington, D.C. Navy Yard, Washington, D.C. 20374 or from the ACM P.D. Committee, P.O. Box 39110, Washington, D.C. 20016.

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And we're continually adding new service features to our Spectrum with an eye to satisfying your future requirements.

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Managers on the Move



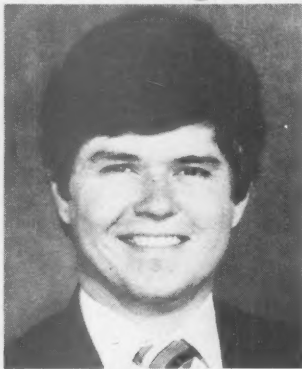
Gary T. Grimm

GARY T. GRIMM has been elected assistant vice-president at Western Savings in Phoenix. He will continue to serve as the electronic data processing auditor.

Before joining Western Savings in 1980, Grimm was employed with Northern Arizona University as a DP auditor. He has also served as a systems manager with the Phoenix Department of Public Safety.

He is the founder and president of the Phoenix Metropolitan Chapter of the EDP Auditors Association. Grimm is also a certified information system auditor and a certified data processing auditor.

MARK ALYEA has been promoted to vice-president of data processing at Alro Steel Corp. in Jackson, Mich. Alyea joined Alro Steel Corp. in March of 1981 as director of data pro-



Mark Alyea

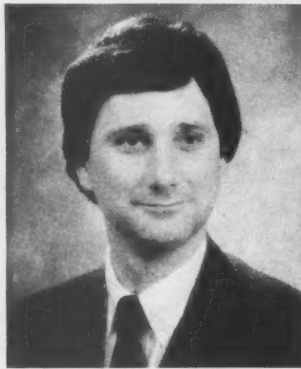
cessing. Prior to joining the company, he was director of data processing at Erb Lumber Co. in Birmingham, Mich.

He graduated Oakland Community College with an associate's degree in business administration.

WILLIAM M. DELLINGER has been promoted to manager in the management advisory service Department of Price Waterhouse and Co. in St. Louis.

Prior to joining Price Waterhouse, Dellinger served with Carolina Power & Light, Telex Terminal Communications and McDonnell Douglas Automation Co. in the areas of programming, analysis and consulting.

He received a B.S. degree in data



William M. Dellinger

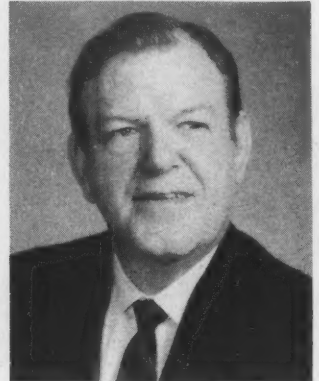
processing from North Carolina State University.

RUSSELL APGAR has been promoted to assistant manager of the Whippary Data Center of the Eastern Division of the Suburban Propane Gas Corp.

Apgar joined the company as a billing clerk at the company's sales and service center and prior to his promotion, was supervisor of data processing at Whippary.

He is secretary of Lakeland Chapter 221 of the Data Processing Management Association.

DANIEL VUJCICH has been appointed assistant manager of systems and programming at CF&I Steel



Russell Apgar



Daniel Vujcich

Corp. in Pueblo, Colo. Vujcich joined CF&I as a counter-

(Continued on Page 22)

OEM EUROPE MEETS AT THE INVITATIONAL COMPUTER CONFERENCES

Seminars on the newest product technology—and "hands-on" displays of the latest computer and peripheral equipment for the quantity buyer are available to European OEMs at the Invitational Computer Conferences.

In Amsterdam, Milan and Munich this October, decision makers will meet manufacturers for "one-day-only" intensive coverage of mini/micro computers, disk drives, CRTs, tape drives, printers, interfaces, controllers, graphic display systems and other equipment. These international conferences are tailored exclusively to meet the requirements of the European OEM—regional locations are selected so extensive travel is not required; the seminars and displays are focused in purpose so there is no sorting through mountains of useless data; and the conferences are limited in size so in-depth coverage can be made in a single day.

Some of the companies displaying products in last year's series were: AED, Century Data Systems, Cipher Data, Data Electronics, Inc., Dataram, Fujitsu, Genisco Computers, Hewlett-Packard, Kennedy Co., Micromation, Inc., Micropolis, Micro Peripherals, Inc., National Semiconductor, Pertec, Priam, Printronix and Remex.

Plan to attend the conference nearest your area. Invitations are available (without charge) from participating companies or from the ICC sponsor. For further information contact:

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(Continued from Page 20)

man helper. He later served as a junior staff accountant, programmer analyst, senior programmer analyst and systems analyst. Before his recent promotion, he was senior systems analyst.

He earned an associate's degree in accounting at Pueblo Junior College and a B.S. degree in business administration at the University of Denver.

JOEL GADDY has been promoted to data center manager at Gilbert/Commonwealth, an engineering and consulting firm in Reading, Pa. Gaddy has assumed responsibility for the production control, data entry and operations functions in the data processing organization.

Gaddy joined Gilbert/Commonwealth at the company's Jackson, Mich., office as an engineer in the Power Division and later was ap-

pointed data processing supervisor in Jackson.

He received a B.S. degree in engineering from Old Dominion University in Norfolk, Va.

WILLIAM T. HOUSTON has joined Colonial Penn Group Data Corp. in Philadelphia as vice-president of the Computer Management Department. Prior to joining Colonial Penn, Houston held several positions with NL Industries, Inc. and most recently was director of management information systems.

He received a BBA degree from St. Johns University and an MBA degree from New York University. He is a member of the Society for Management Information Systems and past

president of the Central New Jersey Chapter of the Association of Systems Management.

MIKE MURNANE has been promoted to vice-president and manager of information resource planning for banking systems for Bank of the West in San Francisco. He is responsible for the development of long-range strategies for bank automation. Murnane joined the bank as assistant vice-president of his department.

He is a member of the Data Processing Management Association.

ROBERT F. MCCAFFERTY was recently elected assistant vice-president of Insurance Data Processing,

Inc. in Jenkintown, Pa.

Prior to his position at Insurance Data Processing, McCafferty held the position of service manager with CNA Insurance Co. Prior to that he was manager with Prudential Property & Casualty Insurance Co. and operations manager with MacMillan Publishing Co.

McCafferty received his B.S. degree in industrial management from LaSalle College in Philadelphia.

ED MAZZEO has been appointed director of management information systems for Trico Industries, Inc. in Gardena, Calif. In this new position, he will oversee the company's computer operations and coordinate the development of systems necessary to generate management information.

Prior to joining Trico, Mazzeo worked for City Investing as manager of corporate information systems. He also has several years engineering and marketing systems experience with IBM's Data Processing Division.

He holds a B.S. degree and an MBA from the University of California in Irvine.

JOSEPH A. DEBLASIO has been elected a technical officer in the Operations Division of Manufacturers Hanover in New York.

DeBlasio joined the bank as a senior systems engineer and formerly served as systems programmer for Insurance Services Offices.

He is a graduate of Jersey City State College.

DANIEL J. CERNY has joined Arvey Corp. in Chicago as managing director of management information systems. He will be responsible for the corporate data processing operations.

Prior to this he was managing consultant for Northwest Industries.

He graduated from Illinois Institute of Technology with a B.S. degree in engineering and earned an MBA degree from the University of Chicago.

RICHARD BLOCK has been appointed manager of business systems at Butler International, Inc. in Montvale, N.J. In this capacity, he will be responsible for the design and implementation of data processing systems developed by the Information Systems Department.

Block joined the company as a senior systems analyst. Before that, he was employed as a project leader at American Cyanamid Co.

He is a graduate of Brandeis University.

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County's DP Center Buys Time For Farmers Before Dry Spell Hits

ROSEBURG, Ore. — Farmers in the Cow Creek area of Douglas County with low-ranking water rights used to get a one-day notice before their irrigation water supply was halted. When the summer dry spell hits this year, however, farmers will have two to three weeks in which to plan for the cutoff.

The advanced notice is made possible through a cooperative effort between the state water master and Douglas County's Office of Water Resources. An IBM 4341 Model Group 1 located in the county's data processing center is being programmed with water-flow data about the area. The 4341 was installed in September 1981, according to Kent June of the technical support office in the county's office of data processing. The 4341 is used to support other county programs besides the water program, June said.

Programmers began feeding data into the 4341 last spring, he explained. The data was gathered over a 50-year period of monitoring tributaries, streams and rivers in the Cow Creek area. When data from gauges in the county drainage network is added to current weather and water conditions, county officials will have a better cutoff forecast. The reports produced by the system are part of a water resources management program that county officials hope will solve water problems for the next 40 years.

Access to irrigation water is set according to the date a property owner is granted water rights. A farmer granted water rights in 1970 will be cut off before a farmer granted rights in 1950, June continued.

Douglas County faces the problem of a dwindling water supply, with less than an inch of rain falling in each of the summer months coupled with an increasing demand from irrigation and municipal users.

If farmers have two to three weeks warning before water is cut off, they can plan for the best economic benefit, John Youngquist, deputy director of water resources for the county, said. One of the major crops in the area is pasture for livestock. If farmers know that irrigation water is going to be cut off, cattle can be left to graze on pasture lands that might otherwise be used for growing crops, he explained.

Monthly forecasts of water conditions will be given during the summer, Youngquist said.

County officials will also

use data provided by the 4341 to decide on the site for a new dam. The dam would control water flow in wet seasons when flood danger exists, provide a constant water supply to ease summer dry spells and maintain the water quality essential to breeding fish.

Sensors planted in the dam face would monitor the wa-

ter temperatures at various levels while other monitors would keep track of downstream water temperatures, he said. Water would be released at different levels from the dam when necessary to create the depth and temperature required downstream for fish breeding.

Officials hope to start dam construction in 1983.

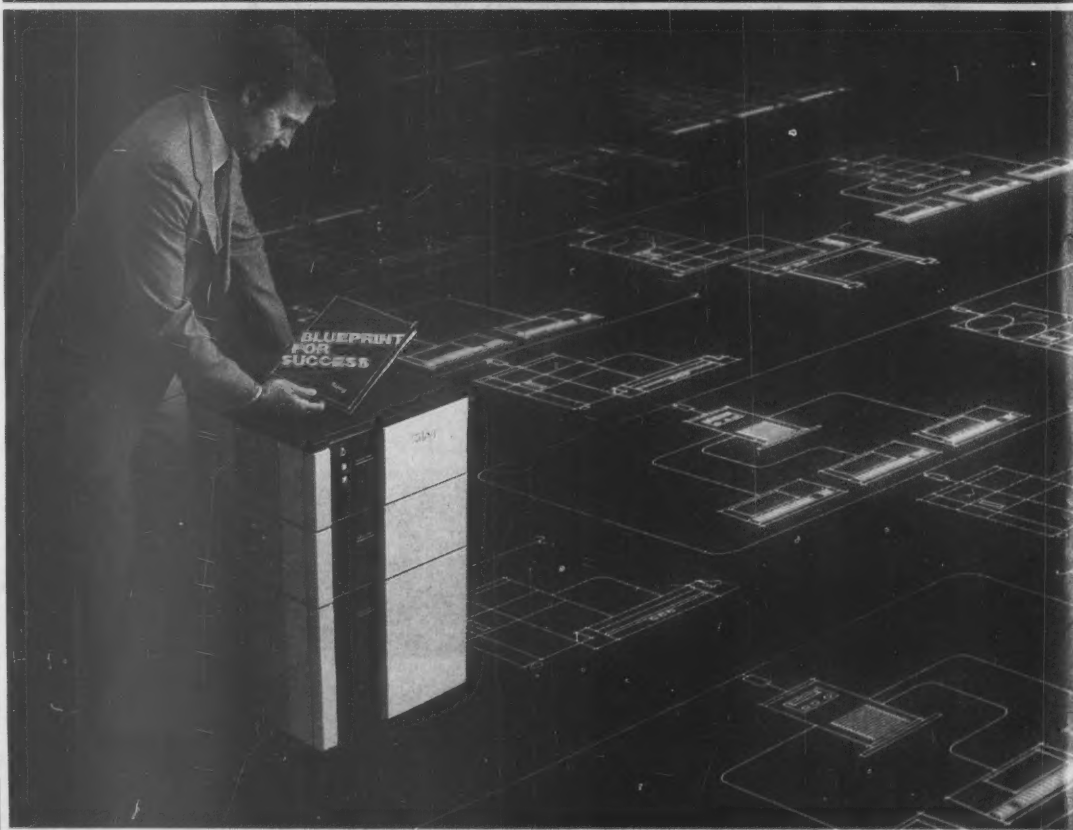
Computer Science College To Open in Fall

BOSTON — Northeastern University has established a College of Computer Science, an independent degree-granting academic unit that will enroll its first freshman class this September.

Paul M. Kalaghen, a former director of the Computation Center at the Smithsonian Astrophysical Observatory in Cambridge, Mass., is acting dean of the college. Kalaghen foresees a faculty of 20 members and a student body of 750 within the next three to five years.

The college concept is the result of two years of research and planning by a university computer committee and a consultant group, according to Northeastern.

Zilog's Supermicro



Processor Ends Conversions for Manufacturer

CLEARWATER, Fla. — After going through three conversions in three years, Eva-tone Corp. — a record manufacturing firm here — decided it was time to find a processor that would last.

"We had no time for developing new applications," DP manager Glen F. Mueller said. The firm was using hardware supplied through IBM's then General Systems Division. "If we had stayed

with IBM, we'd have needed two System/34 processors." Instead, the firm purchased a Wang Laboratories, Inc. VS 100 processor and reportedly saved \$50,000 over the cost of two System/34 processors.

Eva-tone makes thin vinyl recordings, which can be played on an ordinary phonograph. The records are used in magazine advertising campaigns, as well as educational and training ap-

plications.

Back in 1973, the company installed a Burroughs Corp. L-5000 processor for accounting. In 1978, the firm made its first major systems upgrade to a disk-oriented IBM System/32 processor. However, Mueller recalled, the company's work load started to accelerate and by the end of 1978, the firm had installed a second System/32 and had a System/34 on or-

der. A year later, it was apparent that another major upgrade was necessary.

Ease Of Conversion

"One of the reasons we decided to go with Wang was the ease of conversion. If we'd gone to the IBM System/38 or 4300 we couldn't convert our programs. We would have had to write programs to first break up all our records and files and

then write them all back out on the new equipment.

"Because no one (at that time) had converted from the System/34 to the 4300, that would have been an experiment," Mueller said. "We estimated a conversion time of eight to nine months just for current applications. Going from the System/32 to the 34 had taken us six months, and we had far fewer applications then," he added.

Another reason the firm decided on the Wang processor was that it could support more than one language. Mueller said the System/34 was designed mainly for IBM's RPG programming language, and the firm had a government contract that required Cobol.

"We needed both compilers and sometimes we wanted to mix both. One of the reasons we got the government contract is [that] we said we'd either use their batch system and convert it, or write an on-line entry system for them. We're doing that now," Mueller said.

Eva-tone installed a VS 100 processor with 512K bytes of main memory, an 800M- or 1,600M-byte tape drive, two 288M-byte disk drives, a 600 line/min chain/train printer, a 200 char./sec serial matrix printer, a 600 line/min band printer and eight CRT terminals, Mueller said.

Manufacturing Controls

The firm plans to adapt the VS 100 system to function in its manufacturing operation as well as on the financial side. A manufacturing package that will handle material forecasting and buying, inventory, shop-floor control and other functions will be installed this year.

Another application is in the works to track the availability of raw materials, according to Mueller.

In addition to manufacturing control, Eva-tone has designed an accounting package and is planning a word processing application.

The word processing package, Mueller said, is expected to be able to merge selected paragraphs with a subject's name, as well as perform on-line inquiry generation of mailing lists.

"As we replace equipment, we'll add CRT terminals instead of typewriters. Eventually all our sales and other WP will be on line. Already we're doing about 20,000 transactions a week, 60% to 75% of our work load, with two big government mailing lists. Eventually we'll have about 80 periodicals on the system. We're also using it for a number of statistical and producer reports," Mueller said.

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Today, the OEM with big plans is thinking Zilog's System 8000: the Supermicro. This is the breakthrough general purpose microcomputer that easily stands comparison with minis such as the PDP 11 70. For \$29,950, the System 8000 gives you 256 KB of ECC memory, a 24 MB Winchester disk and 17 MB cartridge tape back-up. It is available in both 8 and 16 user configurations, with up to 4 MB added memory and higher capacity disks.

But that's not all. System 8000 supports C, FORTRAN 77, Pascal, COBOL and BASIC languages operating under the acclaimed UNIX* operating system. Zilog is licensed for System III. The System 8000 becomes even more attractive with options that permit hardware independent communication between computers using the UNIX operating system.

System 8000 takes advantage of the latest in Zilog microprocessor advances. It incorporates a Zilog Z8001A 6 MHz CPU with memory management. To keep your system design options open-ended, over the next year the System 8000 will evolve into a complete microcomputer family offering both larger and smaller solutions to your computational needs — all sharing the easy-to-use high speed communications capabilities of Zilog's Z-NET II local area network.

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System Helps Firm in Battle Against Scoliosis

FREEPORT, Texas — With help from a computerized information management system, Intermedics, Inc. here is working on what may be a medical breakthrough in the treatment of scoliosis.

Scoliosis is a debilitating disease of the spinal column that can lead to severe deformity or even death. It currently affects two million Americans whose only options used to be surgery or a back brace, according to an Intermedics spokesman.

The Scolitron system that was developed to fight the disease resembles a transistor radio, he explained. Two electrodes are placed on lateral muscles to stimulate them while the patient sleeps. The stimulation causes the muscle to contract and pull the spine, thereby straightening it and halting progression of the disease.

"We hope that Scolitron will be commercially available this year," said Steven G. Anderson, vice-president of marketing at Intermedics. The information management provided by Tymshare, Inc. makes that date realistic, he said. "Without it, the data analysis phase of the project — which is required by the [U.S.] Food and Drug Administration — would have been extremely difficult and time-consuming."

Important Goal

One of the most important goals of the Intermedics project was to establish a data base on scoliosis.

According to Allen Webb, assistant project manager and designer of the data base, certain features were considered paramount in selecting a computer system. "We wanted a system that was intelligent, flexible, capable of efficiently storing massive amounts of data and easy to use," he said. "Also, we needed reporting and graphics capabilities and the ability to access a comprehensive statistical package. We found that Tymshare's resources best fit our needs."

"Our data base was developed using an information management system from Tymshare," Webb continued. "This system allows us to maintain, access and query our data base; perform analysis; calculate statistics; print reports; and create graphics. However, with Tymshare we can also access other packages such as the Statistical Analysis System, Biomedical Computer Programs and Tell-A-Graf, as they are needed."

Model 430 Installed

In January 1981, a Tymshare Model 430 terminal was installed at Intermedics,

along with a Tymshare Model 350 printer. The terminal is connected via telephone lines to the Tymshare computer center in Dallas. According to Webb, the data base was created and the system up and running within two months.

The computer system catalogs the information into four sections. The first consists of personal information such as age, race, symptoms

of other diseases, the age when scoliosis was first detected and the family history of the patient.

The second section consists of the physical characteristics of each patient — height standing and sitting, trunk alignment, any discrepancy in leg length (in scoliosis patients, one leg is sometimes shorter) and the location of any rib hump.

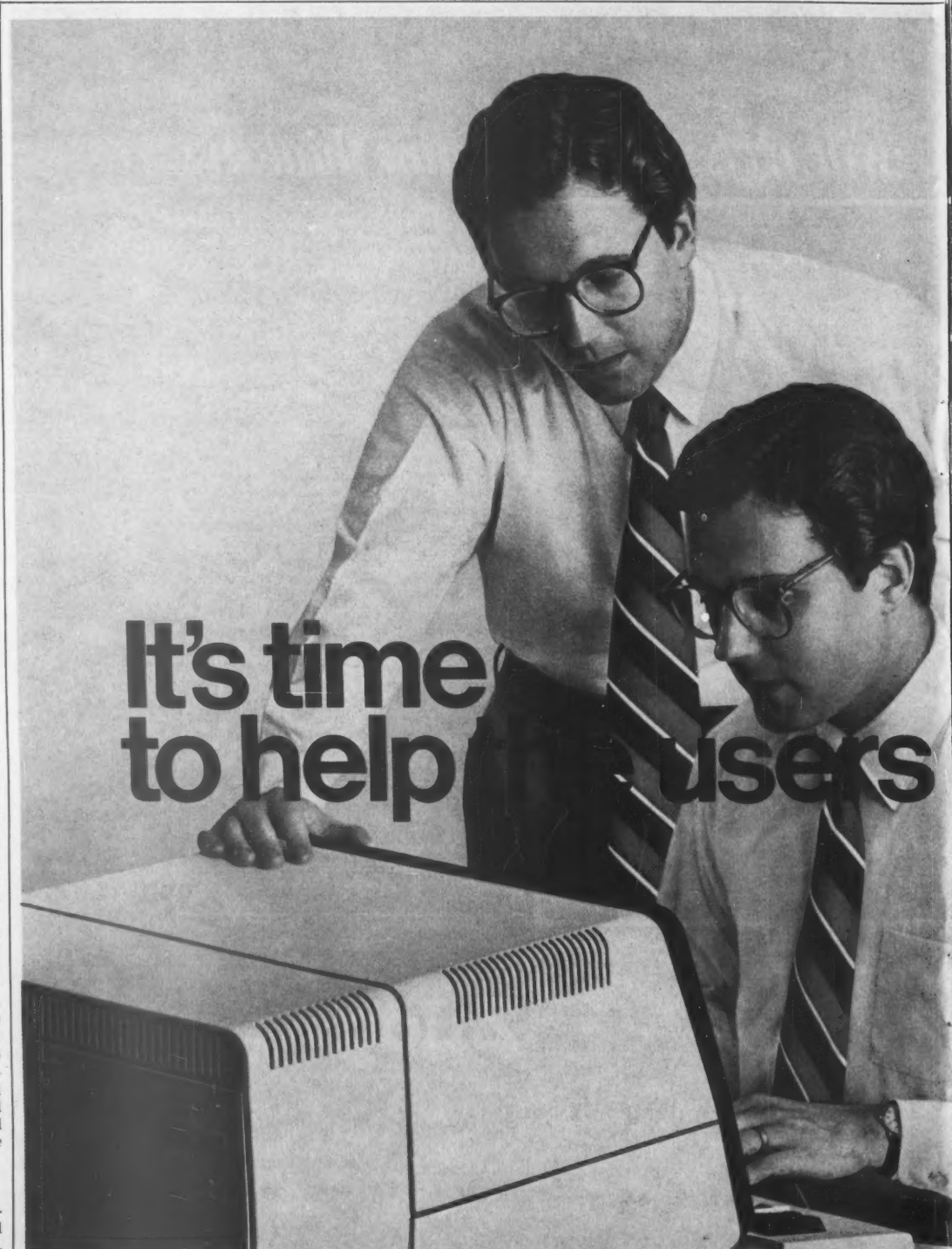
X-ray data makes up the

third. The patient is x-rayed from standing, prone and lateral positions. The size, length, location, flexibility and rotation of the curvature is recorded. Also, the degree of hunchback or swayback associated with the scoliosis is revealed.

The fourth section tracks stimulator information. Data entries in this category include the model number, serial number, pulse width,

pulse current, placement of the electrodes and other such pertinent data, according to Webb.

"Because we have updates on each patient every three months but must still retain all past history on the patient, our data base grows very quickly," Webb said. "We currently store information on more than 500 scoliosis patients, and the file on each is extensive."





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Keeps Tabs on Expense, Cost Figures

Film Studio Reviews Profitability With DBMS

LOS ANGELES — Twentieth Century-Fox Film Corp. is giving rave reviews to a data base management system (DBMS) that has expedited and enhanced its monthly financial statements and analyses.

Such Fox hits as *Star Wars*, *The Empire Strikes Back*, 9 to 5 and about 75 others have all had their profitability

tracked with the Nomad DBMS from National CSS, Inc., a Fox spokesman said.

Martin Shindler, director of financial reporting at Fox, oversees the preparation of financial statements for each film made by the studio. He and his staff have been using the DBMS since late 1978. Their application started with some simple amortiza-

tion calculations producing simple reports, but all financial reporting for the film division is now being handled by the DBMS.

"Our only alternative at the time was to do the reports manually, barely meeting our deadlines for getting the reports produced. Now, we not only get the reports produced by the deadline, we

also have time to analyze the results and ask questions about the numbers," Shindler said.

Noting that over 75% of the films made in the industry today never turn a profit, Shindler said it is crucial to watch the profitability of each film closely. The studio's system tracks each film produced by Fox's Feature

Film Division. Over 400 items exist in the data base to keep tabs on cost and expense figures for each individual picture. Financial statements are prepared from this data for the entire division, he said.

Shindler came to Fox as a financial analyst in June 1979, when use of Nomad at Fox was just beginning. He was promoted to senior financial analyst in February 1980, manager of financial reporting in October 1980 and director of financial reporting in April 1981.

Tracking Profitability

How does Nomad help Fox track its picture profitability? According to Shindler, "It incredibly speeds up and enhances the monthly financial statements and analysis. A data base management system is a must for our operations now." He added, "It used to be all we could do was get the statements together. There was no time to analyze ... to ask why a number was this high or this low. Now, with Nomad, we can analyze and get the information we need. It is one of our primary tools [with which] to do our work."

The DBMS' flexibility has come into play on numerous occasions when the applications requirements have changed. Just recently, Fox added several different data items to a schema that already totals more than 400 items. Nomad's schema REORG simplified this task, he said. Another type of application change that was needed once for their most popular film of all time — *Star Wars*.

The item designated to track film rentals was given a maximum size of \$99 million, he recalled. One day, one of the reports showing film rentals reported "*****" for the film rentals for *Star Wars* — which had exceeded the \$100 million mark for rentals, something the original designers of the data base had never anticipated. A quick REORG of the schema to expand the item's size was performed and everything was in order.

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At the Buick Motor Division, Flint, Mich., James N. Brownlie is Director of Information Systems. "Buick's objective is to make effective use of new technology," he says. "Bringing this latest programs/systems development technology to our end users has resulted in substantial productivity gains."

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help themselves.

Vernon Hills, Illinois, MIS director Carol Norwich says: "Our Information Center has let us cut our application backlog by more than 30 percent; our project people are far more productive."

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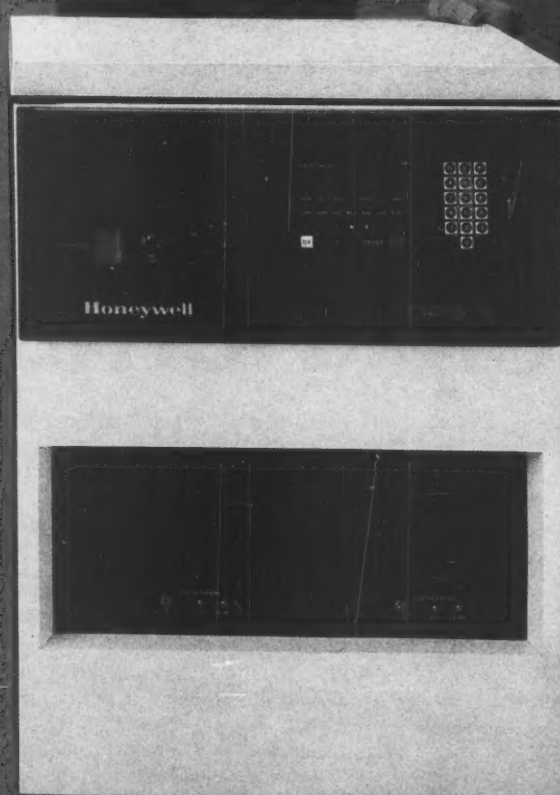
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OFFICE SYSTEMS RESEARCH ASSOCIATION (OSRA) '83, Philadelphia, Feb. 19-20.

OSRA is accepting papers for presentation at its second annual conference. A broad range of office automation research topics will be considered including case studies, overviews, behavioral and psychological implications, environmental factors, career opportunities, white-collar productivity, implementation strategies and collegiate education for the automated office.

Papers and proposals should be submitted by August 31 to Joel D. Levy, OSRA Conference Chairman, c/o Bausch & Lomb, 1400 N. Goodman St., Rochester, N.Y. 14692.

INTERFACE '83, Miami Beach, March 21-24.

Interface is seeking papers eligible for presentation that relate to an aspect of data communications and/or information processing, technology, management, policy or strategy. The author of the best paper will receive

the Harry R. Karp Award and \$3,000.

Abstracts should be no more than 100 words and are due Sept. 1. Abstracts should be submitted to the Program Department, Interface, P.O. Box 927, 160 Speen St., Framingham, Mass. 01701.

THE FIFTH ANNUAL INTERNATIONAL CONFERENCE ON COMPUTER CAPACITY MANAGEMENT, New Orleans, April 18-21.

The conference is inviting papers, case studies, tutorials or experimental results directed toward what a company requires from DP and how DP can meet these requirements. The theme of the conference is "Effective MIS Management." Papers may be technically or management-oriented and should be limited to a presentation time of 30 minutes.

Call for Papers

Suggested topics include effective data base design, business plans integrated into DP plans, financial management aspects, service-level management and reporting, workload characteristics and forecasting, equipment inventory management, costing and income management, budget and project management, efficiency of high-level languages, data reduction techniques, modeling, performance reporting, capacity usage reporting, improving programmer productivity, user management views of DP, instrumentation for capacity management, configuration design, performance of user utilities and designing on-line applications for performance.

Abstracts are due Sept. 1 and should be sent to the Institute for Software Engineering, 410 Oakmead Pkwy., Sunnyvale, Calif. 94086.

NATIONAL MICROGRAPHICS ASSOCIATION CONFERENCE AND EXPOSITION, (NMA) '83, Philadelphia, April 11-14.

NMA is inviting papers for presentation concerning information processing technologies for the technical specialist and the nontechnical or managerial information generalist. Areas of interest include computer-assisted design, office automation, computer graphics, electronic mail, fiber optics, human factors in the office, intelligent copiers, laser technologies, networking, satellite transmission, teleconferencing and strategic planning for office automation.

Abstracts and outlines (250 words minimum) are due by Sept. 3 and should be addressed to Gary W. Pack, Program Review Committee, NMA, 8719 Colesville Road, Silver Spring, Md. 20910.

CONFERENCE ON APPLIED NATURAL LANGUAGE PROCESSING, Santa Monica, Calif., Feb. 1-3.

The Association for Computational Linguistics and the Naval Research Laboratory are inviting papers on the use of computational linguistic techniques. Areas of interest include data, information and knowledge management, training and education, language translation technology and speech recognition and synthesis. Papers should discuss applications, evaluations, limitations and general tools and techniques. Papers describing end-users' experiences with these technologies are especially welcome.

Six copies of an extended summary (5-8 pages) should be sent by Aug. 15 to Beatrice Oshika, System Development Corp., 2500 Colorado Ave., Santa Monica, Calif. 90406.

OPTICAL FIBER COMMUNICATION (OFC) '83, New Orleans, Feb. 28-March 2.

OFC is seeking papers on optical fiber communications and related topics ranging from basic research to hardware manufacture and systems development and applications. The conference will be divided into three principal areas: fibers and cables; active and passive components; and systems, subsystems and new applications.

Both the abstract (35 words) and summary (200-500 words) with a set of figures suitable for digest publication (glossy photographs or original line drawings) are due Sept. 24. All submissions should be forwarded to OFC '83, c/o Optical Society of America, 1816 Jefferson Place N.W., Washington, D.C. 20036.

IEEE COMPUTER AND COMMUNICATIONS SOCIETIES' IEEE INFOCOM '83, San Diego, April 18-21.

The IEEE Computer and Communications Societies are seeking papers for their second annual joint conference titled "Computers and Communications Integration: Reality and Illusion." Areas of interest in-

clude, but are not limited to: computer network architectures, digital private branch exchanges, multiaccess communication local networks, bus architectures, communication protocols, software design, distributed processing, communication media, office automation, distributed data base systems, user experiences, computer communications standards, privacy and security, social impact and integrated services digital networks.

Completed papers (four copies) are due Aug. 15 and should be submitted to Dr. John Spragins, Program Chairman, IEEE Informcom '83, P.O. Box 639, Silver Spring, Md. 20901.

INTERNATIONAL SYMPOSIUM ON COMPUTER ARCHITECTURE '83, Stockholm, Sweden, June 13-16.

The Institute of Electronics and Electrical Engineers, the Association for Computing Machinery, Euromicro and the National Swedish Board for Technical Development are soliciting papers on aspects of computer architecture.

Topic areas include architectural aspects of numeric and symbolic computation, architectures for knowledge-based systems, data and demand-driven architectures, educational and descriptive aspects of computer architecture, impact of advances in microelectronics and optics, object-oriented architectures, principles of interconnection, tools and methods for architecture description and synthesis, vertical function distribution and distributed and parallel architectures.

Submitted papers will be accepted for evaluation until Oct. 15. Five copies of the manuscript should be sent to Prof. Jean Loup Bser, University of Washington/Computer Science Group, Seattle, Wash. 98105.

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Aug. 2-4, Boston — **Advanced DP Management: Methods and Techniques in the '80s.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Aug. 2-4, Dallas — **Data Communications: An Introduction to Concepts and Systems.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Aug. 2-6, Cambridge, Mass. — **Operating Systems.** Contact: The Office of the Summer Session, Room E19-356, MIT, Cambridge, Mass. 02139.

Aug. 2-6, New York — **Auditing in the Contemporary Computer Environment.** Contact: Marge Umlor, DP Auditors Foundation, 373 S. Schmale Road, Carol Stream, Ill. 60187.

Aug. 3, Boston — **Dealing With Vendors & Suppliers.** Contact: Performance Seminar Group, 1 Commerce St., Norwalk, Conn. 06850.

Aug. 3-5, New York — **SAS Computer Performance Evaluation Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Aug. 4-5, Atlanta — **Advanced Application and Techniques in Sales Forecasting.** Contact: American Software, 443 E. Paces Ferry Road, Atlanta, Ga. 30305.

Aug. 4-5, Cary, N.C. — **SAS Basics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Aug. 4-6, New York — **SAS Exploratory Multivariate Data Analysis Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Aug. 4-6, Washington, D.C. — **Structured Systems: Analysis, Design and Programming.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Aug. 4-6, Washington, D.C. — **Data Security: Implementation and Management.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Aug. 5-6, Boston — **Software Life Cycle Documentation.** Contact: Education Foundation of the Data Processing Management Association Seminar, P.O. Box 91295, 5959 W. Century Blvd., Los Angeles, Calif. 90009.

Aug. 5-6, Saddlebrook, N.J. — **Understanding New Telecommunication Technologies for Nonengineers.** Contact: Telestrategies, Inc.,

Suite 102, 6842 Elm St., McLean, Va. 22101.

Aug. 5-6, Saddlebrook, N.J. — **Telecommunications Technologies and Strategic Planning.** Contact: Telestrategies, Inc., Suite 102, 6842 Elm St., McLean, Va. 22101.

Aug. 5-6, Summit, N.J. — **IMS Data Communications.** Contact: Chubb Institute Advanced Training Center, 480 Morris Ave., Summit, N.J. 07901.

Aug. 5-6, San Jose, Calif. — **Structured Methodology.** Contact: Education Foundation of the Data Processing Management Association, P.O. Box 91295, 5959 W. Century Blvd., Los Angeles, Calif. 90009.

Aug. 5-6, Houston — **How to Develop and Use a Computer-Based Marketing Information System.**

Contact: University Seminars, Suite 2846, 420 Lexington Ave., New York, N.Y. 10017.

Aug. 8-12, Karlsruhe, West Germany — **International Joint Conference on Artificial Intelligence.** Contact: Alan Bundy, Department of Artificial Intelligence, University of Edinburgh, Hope Park Sq., Meadow Lane, Edinburgh, EH8 9NW, Scotland.

Aug. 9-10, Cleveland — **Data Communications: Advanced Concepts and Systems.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Aug. 9-10, Chicago — **Using CAD/CAM Systems: Planning, Equipment Selection and Applications.**

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Aug. 9-11, Washington, D.C. — **Information Systems Planning: A Structured Approach.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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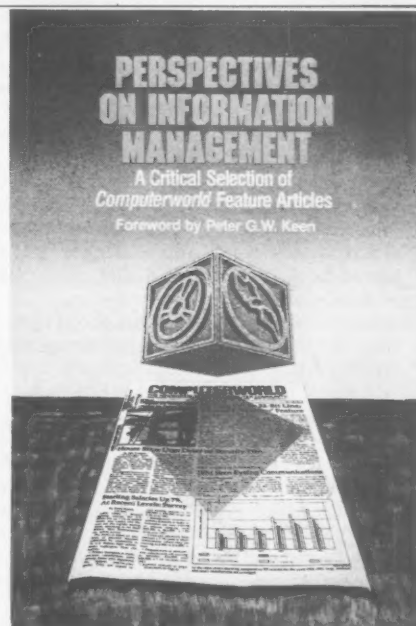
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PERSPECTIVES ON INFORMATION MANAGEMENT

**A Critical Selection of
Computerworld Feature Articles**

Foreword by Peter G.W. Keen



In 1979, COMPUTERWORLD, the world's largest publication for the computer and data processing industry, began a new feature section called "In Depth." The articles that appeared were just that—in-depth writing that went beyond the news reporting level, and offered deeper insights and more practical information. To be "In Depth," each article had to be written by a practicing professional who knew his or her field inside out.

"In Depth" met with such success that COMPUTERWORLD launched COMPUTERWORLD EXTRA!, a thrice-yearly magazine of original articles. Today, thousands of computer and DP people rely on COMPUTERWORLD "In Depth" and EXTRA! features to keep up-to-the-minute on new developments, and get practical insights on how to be more effective in their work.

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'PharmaSources' 1982 Edition Out

PRAIRIE VIEW, Ill. — The 1982 edition of *PharmaSources* was released here by Flexible Software, Inc.

The 170-page directory contains pharmaceutical, biological and medical software and data base services from all over the world, according to the publisher. It also includes statistics, graphics and chemistry software.

PharmaSources-82 costs \$85 from Flexible Software at P.O. Box 47, Prairie View, Ill. 60069.

EDITORIAL

Probing Problem Drivers

Congress is about to approve a multimillion dollar program to build a nationwide, on-line DP/telecommunications system that will provide state driver licensing authorities with information on problem drivers [CW, July 5]. The National Driver Register (NDR) would be run by the Department of Transportation, which only a year ago said the system should not be built.

At that time the Department of Transportation, having made an extensive study of the NDR proposal, said the system would not be effective because at least some states would balk at participating. The reasons were cost, privacy and constitutional rights considerations, as well as a reluctance to allow the federal government to interfere in the authority of the states to license drivers.

The Reagan administration has now been persuaded to back the NDR proposal by groups seeking stricter laws against drunk driving. Unfortunately, it is a cruel hoax on these worthy organizations to suggest the NDR will stop the senseless death and destruction caused by drunk drivers.

These organizations hope to stop drivers who have lost their licenses for drunk driving from getting permits in other jurisdictions. But unless almost all states are willing to participate, willing to change their privacy laws to do so — including instituting use of Social Security numbers as universal identifiers — and willing to put up millions of dollars to keep the NDR running, the system has no realistic hope of success.

Even if the states cooperate, the system will do nothing to keep suspended drivers from driving without permits or driving while intoxicated, which is the real problem in the first place. In the end, the likely result of the NDR proposal will be a hundred million dollar boondoggle that is an invasion of privacy, may be illegal and unconstitutional for the federal government to run, will have a large problem with data error and probably won't work anyway.

Most *Computerworld* readers do not have to be reminded that even the most sophisticated computers can only do so much. Automating an ineffective or bad system does not necessarily make it a good system. But sometimes makers of public policy and national laws can be carried away with false expectations that if enough money is spent on enough computers, just about any problem can be solved.

The NDR is a perfect example of the limits of technology.

DATA PAST

Five Years Ago July 11, 1977

WASHINGTON, D.C. — The President's Reorganization Project in the Office of Management and Budget began a comprehensive examination of all federal DP procurement and management, according to then-project associate director Wayne G. Granquist.

WASHINGTON, D.C. — The Justice Department formally revoked a memorandum authorizing the Federal Bureau of Investigation to develop a computerized message-switching system.

The system, which could have monitored the communications functions of state and local law enforcement agencies, was turned down by the Ford administration but resurfaced.

Ten Years Ago July 12, 1972

WASHINGTON, D.C. — The Supreme Court "unwisely and wrongly" ignored the danger of computer-based data banks when it rejected an attempt to outlaw such dossiers in the *Tatum vs. Laird* case, then-Sen. Sam J. Ervin charged.

Ervin introduced legislation in the Senate to ban the Army or any military service from conducting data bank operations on civilians.

DAYTON, Ohio — Codasyl's Programming Language Committee considered a proposal to delete the Report Writer facility from the Cobol standard.

The Air Force proposal called for the dropping of the RPG-like function.



LETTERS

More Information

I was very pleased to read about my presentation at the National Computer Conference ["Medical DSS Development Seen Difficult, Inefficient Process," CW, June 14].

Unfortunately, the article quotes me as saying that "the system is not being made available commercially."

This is incorrect and not what I stated at the conference. I said that while the Knowledge Management System is not itself available, an augmented commercial version has been implemented.

Information on the commercial system may be obtained from Knowledge Engineering, Inc., Suite 1220, 1401 Wilson Blvd., Arlington, Va. 22209.

James A. Reggia
Department of Neurology
University of Maryland Hospital
Baltimore, Md.

Some Notes on DES

Michael Schwartz's In-Depth article, "DES: Putting It to Work" [CW, June 21], was a good introductory presentation of a complex subject. However, he made a couple of serious mistakes that need to be corrected.

If, as noted on Page ID/7, the DES is used as a pseudo-random number generator (and this observation is correct), then contrary to Page ID/10, it is not possible to use frequency analysis to recover the data.

Elsewhere the author indicates that errors are helpful to data communications.

This is definitely not the case. The receiver has no way to know that the data is wrong, using the DES, as on the receiving end all data must be considered as what was intended to be sent.

Using the usual techniques for cyclic redundancy check (cyclic check

character), any errors in data communications will be detected independently of the DES or having any knowledge of what data was a priori correct.

Even decrypting erroneously received data would not tell the receiver that the data was wrong.

Whether the DES was used or not, the only way to detect errors requires additional information (such as the cyclic redundancy check) to be sent as an adjunct to the real data. The data itself cannot carry the information of its correctness. The usual data communications techniques are quite adequate to ensure reliable data transfer without the DES, which cannot assist the communications process.

I also noted some minor errors that were of no consequence to the understanding of the principles involved.

For historical accuracy it should be noted that the Vernam technique is quite different from the One-Time Pad. The Vernam technique XORs the data with a random bit pattern that repeats at regular intervals, although usually large intervals are used.

Schwartz made a very good point about key control, but his statements about waking up major companies to the (alleged) need of the DES detract from his article.

William B. Adams
Adams & Associates
Springfield, Va.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters may be edited for purposes of brevity and clarity. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, P.O. Box 880, Framingham, Mass. 01701.

READER COMMENTARY / Robert Davis†

Data Relational Analysis: A Rational Approach

If a programmer makes a mistake while coding a program, it normally will cost the project no more than a couple of days to find and fix the error.

If, on the other hand, a system designer makes a mistake and it is not discovered until after the programming has been done, this mistake could very well cost the project a week or more.

But the most disastrous errors of all are those made by systems analysts. Their mistakes can cause whole portions of a system to be scrapped and redone, causing weeks or even months of delay.

What is needed, if we are to avoid these costly mistakes, is a more rational, disciplined approach — an approach with a proven conceptual base that is effective in the business world. Data relational analysis is such an approach.

To understand the conceptual foundation of data relational analysis, we must start defining what a system is.

A system is just a collection of objects that are related to one another. If the job of the systems analyst is to define a system, and if a system is just a collection of objects and relationships, then the job of the systems analyst must be to identify for the system in question particular objects and relationships.

Business information systems are intended to take data that, from the user's point of view, is not in a particularly useful arrangement and rearrange the data in such a way that it becomes useful.

The two key components of such a system are its data and the processes or functions that perform the desired

transformations. Of these two components — data and function — data is the more direct determinant of a system's objects and its relationships. That is because data is really just the representation of particular occurrences of a system's objects.

For example, a particular employee's name, address and telephone number is just one unique occurrence of a system object called "employee." If that same data also included a list of job function codes, then it would represent an occurrence of two objects, "employee" and "job function."

It would also indicate that a relationship exists between these objects, perhaps called "performs" (such as employees perform job functions). The data comprises the system's objects.

Responsive to User

It is generally agreed that for a business information system to be effective it must be responsive to the needs of its users. The information needs of users are the products of business information systems. They are the system's outputs. And outputs, no matter what their presentation media, are just data arranged in some particular manner. This is exactly what we're looking for — data and its structure.

Consider, for example, a training operations system that produces as one of its outputs a class schedule. This class schedule includes data such as course name, starting date, ending date and classroom, arranged so as to be most usable by potential students.

By defining the data content and

structure of each information requirement of each system user, we will have identified all the data the system requires and all the ways it must be structured.

By normalizing this data we are able to derive the system's objects. Normalization is a method for finding the least common denominator. It is a way of ensuring that if we are dealing with apples and oranges we call them both fruit.

The relationships between a system's objects are a reflection of the objects and relationships users perceive to exist in the real world. They are not imposed by the systems analyst.

But how does the system analyst know who the users of a particular system are and which of their information needs the system must satisfy? The system analyst must first determine two things: What is the purpose of the system in question and what is its scope?

A system's purpose is defined by its sponsors — the people who pay the bill for its development and operation. These are the people who must decide why the system is being built.

The system analyst's job is to assist the system's sponsors in clearly stating the system's purpose. But knowing the system's purpose is not enough. The systems analyst must also know what the boundaries are.

A system's boundaries are identified by defining its goals and objectives. Goals are statements of what a system must achieve in order to be considered a success. Objectives identify how that success is to be measured.

Consider the previously mentioned

training operations system. Its purpose might be to facilitate the operation and administration of the company's training organization.

This explains why the system is being built. One goal of this system might be to inform potential students of all formal training opportunities with sufficient lead time to take full advantage of these opportunities.

This objective defines how the system will be judged at achieving the above stated goal. It defines what must be produced, for whom, by when and with what accuracy. From this objective, the systems analyst can easily determine that employees are users of the system and that a class schedule is one of their information requirements.

Knowing this, the systems analyst can meet with representative employees to identify more precisely what is needed.

In summary, the key concepts of data relational analysis are:

- A system is a set of objects and their relationships.
- These objects and their relationships can be derived from its data and that data's organization.
- A system's data and its organization is best identified by those user information needs that it must satisfy to be a success.
- The user's information needs that a system must satisfy are those identified by the system's purpose, goals and objectives.

These four concepts are the essence of data relational analysis.

Davis is a principal at Data Kinetics, a data processing consulting firm located in Princeton, N.J.

HUMAN CONNECTION / Jack Stone†

Staff Morale Takes Cue From Management

Believe it or not, it is possible to build and maintain the morale of data processing professionals, but not without a substantial application of time, effort and now, more than ever, creative thinking on the part of data center management.

Stephen Roberts, who was responsible for administrative systems at Catholic University of America, was quite aware of staff morale problems as he implemented a string of new operational policies that were intended to convert the systems activities into something resembling a conventional business operation and bring the staff into the office during normal work hours.

Many long months passed for him until the DPs finally — and grudgingly — accepted the policies. Unfortunately, they were unhappy about it and continued to find excuses for not showing up from nine to five.

Personnel Battle

So Roberts jumped into the personnel battle with both feet. Fortunately, he had the wisdom of Karl Thomas, the center's director, for support. One of many useful guidelines that

This is Part 11 of a continuing series on how to succeed as a data center manager.

Thomas suggested to Roberts was this: "Follow-through in personnel actions is as important as the action itself. Don't give an order or set up a new procedure or announce a policy change unless you know it will succeed and you will pursue it vigorously."

Roberts addressed the morale issue in a variety of ways. He organized a weekly staff meeting to ensure a regular, formal means of communication which, to this day, is held religiously each Friday afternoon. New tasks are announced, progress on old tasks are reported on and personnel assignments are distributed there.

The meeting also provides a forum for airing problems and receiving staff opinions on possible policy changes.

But Roberts was quick to note that "I give the staff the opportunity to comment on pending policies in advance, but there is a limit on their

share of 'participative management.' Policies that govern the operations of my systems staff are not derived by committee action but are mine alone."

Roberts initiated centerwide, center-sponsored social lunches. He started them as "going-away parties" to celebrate the departure of a staff member, but soon changed the theme to "survivor's parties" given for the remaining staff the day after a DP left.

He established a program of recognition for well-deserving members of his staff. He made it a point to say "well done" or suggest a letter of commendation from Thomas or the university when appropriate. He even encouraged users to toss a bash for his staff when major systems came on-line.

Roberts adjusted the task assignments as necessary to give the staff variety in both type of system and intensity of work. He frequently rotated staff, at all levels, among the various systems, which also provided the major benefit of cross-training. He varied the pace of tasks to relieve work pressures and keep the staff

from "burning out."

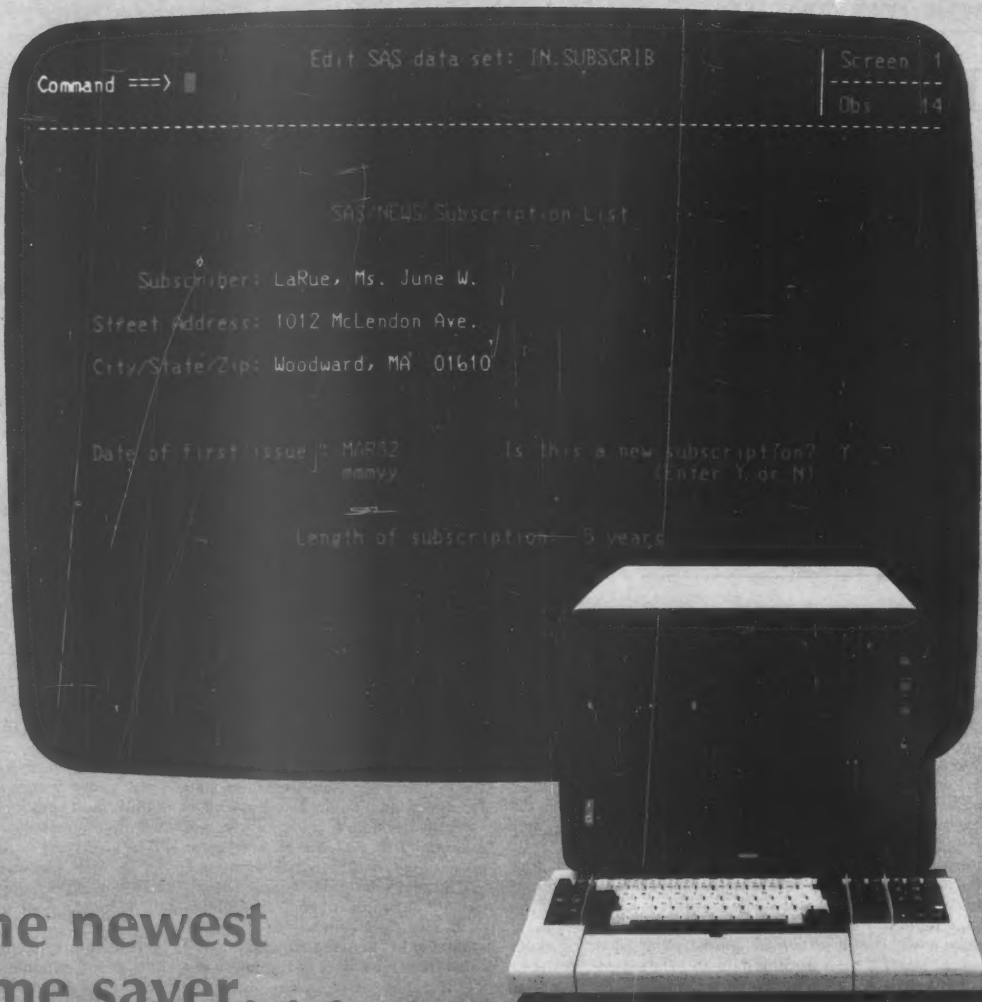
Physical layout was not a serious problem since nearly all the staff had individual offices and their own terminals. But sprucing up the public areas and new paint for the offices were necessities, and these projects were completed.

But it was the matter of personal leadership that did the most for morale. Roberts expressed it this way: "It took me a while to appreciate it, but staff morale derives in no small way from my own [morale] in the role as their manager."

"Let's take documentation, for example. As an analyst I hated to document systems, a viewpoint that carried over when I first became a manager. So I allocated these tasks to the staff with an apology and some words like 'somebody's got to do the dirty work.'"

"I figured out later that I was discouraging the staff from taking a positive view toward documentation, so I changed my approach in a hurry."

Letters to Stone should be addressed to him at Box 270, 1377 K St. N.W., Washington, D.C. 20005.



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IMS Users Get Transaction, Monitor Tool

CARMEL, Ind. — A real-time monitor and transaction accounting package for users of IBM mainframes and plug-compatibles has been announced here by Omnimon.

The IMS Ata Glance (IAG) package has four 3270 screen formats using high and normal intensities or color to display information, according to the vendor. The accounting component produces a record for each transaction, including user identification, transaction name, CPU time, elapsed time and data base calls/user. A batch program produces a graph summary report for the entire monitor period, a report of all exceptions, an accounting report of each transaction and an accounting data set containing a 60-byte record of each transaction, the vendor said.

IAG reportedly requires no modification and can be installed on systems running IBM's IMS that are operating in an MVS or VSI environment. The purchase price of \$4,850 includes a 30-day trial period and one year of maintenance.

Omnimon can be contacted at Box 745, Carmel, Ind. 46032.

Allows Access to Data Base

DBMS' 'IDMS Toolkit' Enhanced

NAPERVILLE, Ill. — Another addition to Cullinane Database Systems, Inc.'s Integrated Data Base Management System (IDMS) Tool Kit has been announced here by DBMS, Inc. DML/Online is an interactive software productivity tool that enables programmers, data base administrators and information managers to access an IDMS data base for update or retrieval, according to a vendor spokesman.

With this software, program-

APL*Plus With Nested Arrays Said Time-Saver in Development Project

By Lois Paul
CW Staff

BELLEVUE, Wash. — A prototype of a software development project that probably would have taken five weeks if written immediately in the prescribed assembler language was prepared in four days using STSC, Inc.'s APL*Plus with its recently announced nested arrays extension.

The project involved a proposed enhancement to a utility included with VM Software, Inc.'s VMbackup for users of IBM VM/370 or VM/SP systems.

A working document of the proposed enhancement was developed by Ron Kral, director of development for VM Software. "We supply with the package the VM directory, which extracts the mini disk records and builds mini disk backup records that can, in turn, be fed into the backup cycle."

Users Wanted Flexibility

What Kral found was that users wanted more flexibility in the backup routine, which would enable them to encode certain IDs or to not back up

other IDs. "They used to run the utility and then go in and delete the ones they didn't want to back up, or put options on certain ones."

Through market research, the firm identified the major modifications that users were making. "We came up with a technique that would allow us to specify an additional file to be put into this process, and we termed that an exception file. It allows you to define exceptions to the general rule."

The specifications were brought to Michael Crick, an independent consultant based in Bellevue, Wash., who specializes in the APL language. The requirement was that it be written in assembler and be a stand-alone program.

Complex Program

Recognizing the program's complexity, because it had to

detect a number of possible error conditions, Crick decided that his first step should be to confirm VM Software's requirements for the program. "So rather than start right in and write the assembler program, I thought this would be a marvelous opportunity to write this in APL," he explained.

Using APL, he felt he could develop a running program within several days that he could show to VM Software. Once he was certain it provided the results they were seeking, he would translate the program into assembler.

It took him about four days to write the APL program. After VM Software made some adjustments to the program design, Crick spent about three additional weeks translating the program into assembler. "If I hadn't spent that four days

(Continued on Page 36)

Version 4.1 of 'Panexec' Adds 'Abend-Aid' Interface

OAK BROOK, Ill. — Pansophic Systems, Inc. has announced the release of Version 4.1 of its

IBM OS version of the firm's Panexec management control package. Panexec runs on IBM and plug-compatible mainframes under OS/MVS and DOS/VSE.

Highlights of the new release for OS systems include a facility that provides an interface with Abend-Aid, proprietary software from Tomark, Inc. which is marketed by Compuware Corp.; support of 3375 direct-access storage device for Panexec libraries; OS partitioned data set and sequential file processing; and program temporary fix maintenance.

Panexec ranges in price from \$12,500 to \$19,500, according to the vendor.

Pansophic is based at 709 Enterprise Drive, Oak Brook, Ill. 60521.

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TI Ups Speed, Capacity, Performance of Dnos

AUSTIN, Texas — Texas Instruments, Inc. has announced an enhanced version of its multiuser, multitasking, disk-based Dnos, which reportedly provides users of its mid to upper range of commercial minicomputers with increased speed, capacity and performance.

The vendor also released a Dnos Performance package that incorporates the Dnos Cobol Plus package, which uses TI's 990/12 processor to provide faster execution of Cobol programs under Dnos. The performance package consists of enhancements that were made for Dnos by utilizing the writable control store microcode feature of TI's 990/12 processor and a new version of Cobol Plus.

The enhancements to Dnos include developmental and operational support for Cobol, Pascal and Fortran-78, the vendor noted. The operating software also supports productivity aids that include query, sort/merge, TI's Tiform screen-handling tool, a data dictionary and Tape, TI's word processing package.

To facilitate use of Dnos, the operating environment reportedly now enables users to enter commands or prompts into either edit or command mode in uppercase, lowercase or any combination. In addition, the Dnos text editor now can edit records of up to 240 characters. Also included in the text editor is a word-wrap feature and an exclusive edit feature designed to prevent several people from trying to edit a single file at the same time.

Dnos 1.1 and the Dnos Performance package are scheduled for customer shipment in the third quarter of 1982. The enhanced version of Dnos is available free of charge to current customers who have an up-to-date maintenance subscription. Otherwise, the license fee for Dnos is between \$4,000 and \$4,800, depending

on the configuration. The fee includes maintenance for one year. Subsequently, the maintenance subscription fee ranges from \$800 to \$1,200, depending upon the configuration.

The Dnos Performance package carries a license fee of between \$2,000 and \$2,800, depending on the configuration. This includes one year of subscription support. Thereafter, the annual fee for maintenance is between \$600 and \$1,200, depending on the configuration.

TI can be contacted through P.O. Box 202146, Attn: H-623, Dallas, Texas 75220.

APL*Plus A Time-Saver

(Continued from Page 35)

with APL it probably would have taken me five weeks. It would have been a much more painful process," he recalled.

"This way the customer knows pretty much exactly what he wants. The APL was so easy to change. There was no feeling that one couldn't change it without a lot of work," he added.

Because this application involved records that included character fields, numeric fields and both fixed- and variable-length fields, Crick decided to use the nested arrays extension to STSC's APL*Plus product which, at that time, was available in only a test version. The nested arrays facility was designed to allow a single expression to link both character and numeric data.

Because the application required matching of records, Crick used the APL operators included with the nested arrays extension. Instead of having, for example, 14 logical entities that required 14 operations for uniform data manipulation (which would have been necessary with standard APL), Crick was able to store the entities in a single nested array.

"Then I could treat the records as a vector of 14 scalars and do large amounts of manipulation at once across the entire array. This turned out to be very nice. I think it is one of the biggest advantages of APL," he said.

Rather than making the APL language more complicated, Crick said that the nested arrays extension actually makes it easier by removing a number of restrictions to the language.

Crick said he does most of his consulting work, which involves exclusively business applications, using APL. "It is a very terse language, which allows you to write code without a great deal of effort. Also, it has extremely good debugging capabilities. Once you have written it, it is very easy to find what the problem is."

"I have some very large APL systems that would be an order-of-magnitude larger product in another language, such as Cobol or PL/I. In fact, they would be beyond the scope of the entire system," he added.

Business Units Get Order Entry

NORTHBROOK, Ill. — An Order Entry and Invoicing software package is currently available from General Binding Corp. (GBC) for its GBC System 9 and System 12 small business computers.

The software package reportedly functions as either a stand-alone system or as an integral part of the total GBC Business/Financial System. It was designed to store information on customers, orders and products, permitting terminal entry to a central file. It retrieves the status of orders and provides a multilevel finished goods/inventory file, according to the vendor.

According to the vendor, other features include inquiry capability, tax collection and reporting facilities, automatic credit limit checking, receivables posting, inventory updating and invoicing.

The Order Entry and Invoicing package costs \$599, the vendor said from One GBC Plaza, Northbrook, Ill. 60062.

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'Docu/Master' Gets Vsam Support for FBA

NORWALK, Conn. — TSI International has announced the addition of IBM Vsam support for its Docu/Master on-line document storage and retrieval system.

With Vsam support Docu/Master's capabilities reportedly have been extended to all IBM systems with fixed-block architecture (FBA) disk devices, including the 4300 line.

Docu/Master operates on IBM 370 and compatible hardware under DOS and OS. The on-line version is said to be available for use with CICS or as a "bundled"

system with TSI's teleprocessing monitor, Task/Master. Docu/Master is compatible with TSI's Key/Master on-line data entry package.

For OS systems, Docu/Master costs between \$13,500-\$30,000. For DOS systems, the price ranges from \$10,000 to \$22,500. TSI is located at 50 Washington St., Norwalk, Conn. 06854.

'Umbrella System' Goes Stand-Alone

DALLAS — Hogan Systems has announced that its Umbrella System software is now available on a stand-alone basis for the commercial marketplace. This product was formerly a part of the firm's banking software product line and runs on IBM mainframe computer systems and plug-compatibles, according to the vendor.

The Umbrella is an integrated structure consisting of

several approaches to developing and maintaining application systems, according to the vendor.

Entries in the Umbrella processing dictionary determine program code execution, the sequence of execution and the relationship between the logical environment, built for the programs by the Umbrella, and the real environment, a vendor spokesman said.

Another feature of the Um-

brella structure is the ability for on-line control and tracking of all enhancements, fixes, changes and new products. Reports for management are available by project, system or by individuals, the vendor said.

The Umbrella System sells for \$150,000, according to the vendor.

Hogan Systems can be reached at Suite 400, 14951 Dallas N. Pkwy., Dallas, Texas 75240.

'Adas' Adds 3375 Support

BROOKFIELD, Conn. — Universal Software, Inc.'s automatic disk space manager for IBM DOS/VS and DOS/VSE operating systems has recently added support for IBM 3375 disk drives.

Adas reportedly acts as a productivity tool that enhances CPU capabilities and optimizes Dasd utilization.

The product can be leased for \$200/mo and is available for free in-house evaluation.

Universal Software is located in the Brookfield Office Park, Brookfield, Conn. 06804.

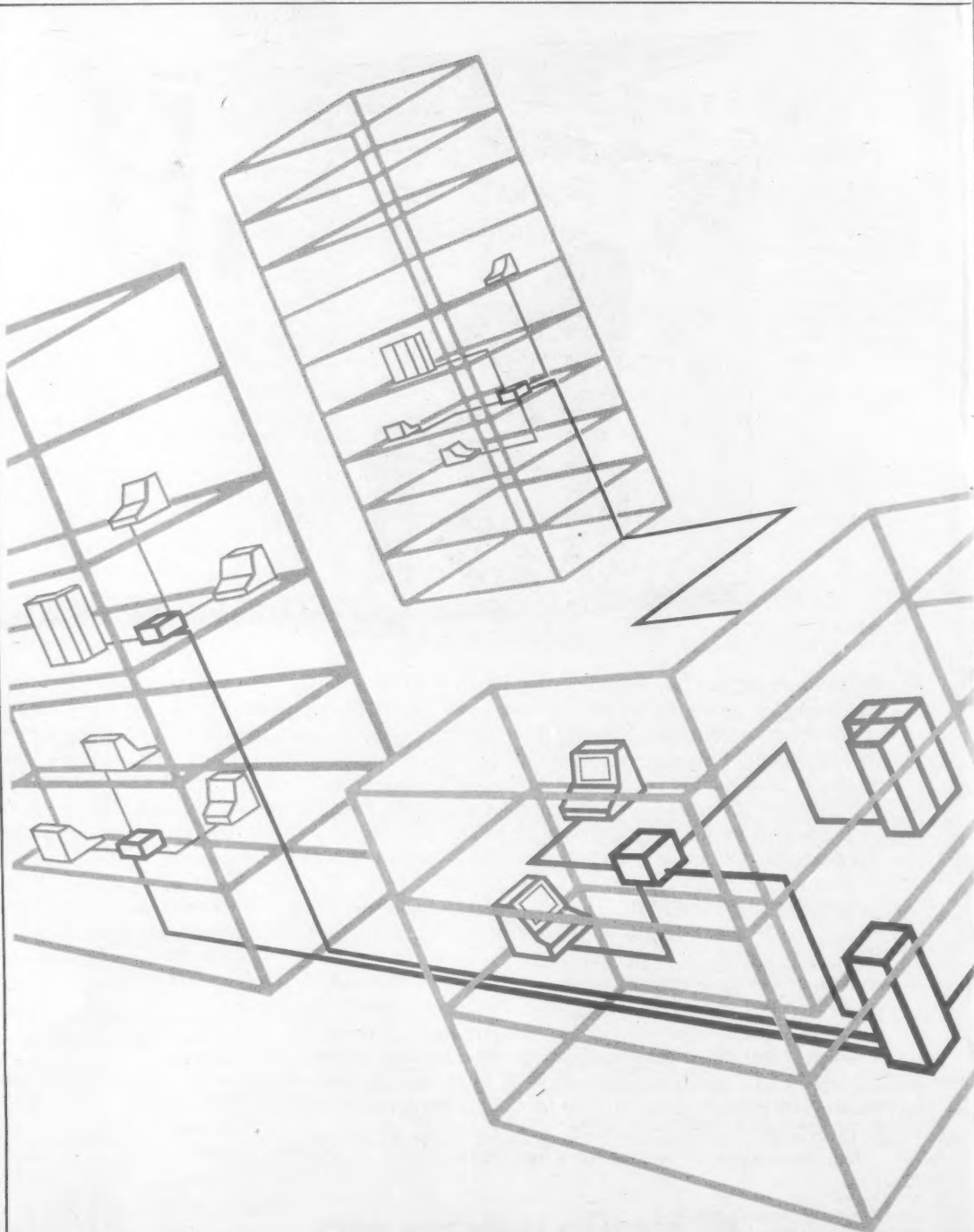
'Capasset' Fits System/24

FULLERTON, Calif. — A Capital (Fixed) Assets System designed for the IBM System/34 is available from American Business Computer Systems.

The on-line, menu-driven Capasset package features full-screen edit checking and user friendliness. The software is said to permit nine depreciation methods, including four 1981 Accelerated Cost Recovery System methods.

The system tracks assets, performs monthly/yearly book and tax depreciation, provides month-end/year-end reports, permits depreciation expense modeling for one to 20 years in the past or future and contains an on-line user guide to the system.

The one-time charge ranges from \$2,750 to \$3,950, depending on options, with a 30-day money back guarantee. On the East Coast, the software is available from Mincron SBC Corp., Suite 2810, 350 Fifth Ave., New York, N.Y. 10118. American Business' address is 2515 E. Santa Fe Ave., Fullerton, Calif. 92631.



Innovative Data Processing Announces Price Hikes

CLIFTON, N.J. — Price increases on three products were announced here by Innovative Data Processing.

The cost of Version 4 of the company's Automatic Backup & Recovery software will go up from \$5,000 for a license to \$6,000. The Fast Analysis of Tape Surfaces system will jump from \$2,500 to \$3,000, and the Fast Analysis of Tape and Recovery will inflate from \$1,500 to \$2,000.

These products run on IBM OS, VS and MVS systems and plug-compatibles, according to the vendor. Price hikes will take effect Sept. 1, the vendor said from 970 Clifton Ave., Clifton, N.J. 07013.

Adds On-Line Audit Trail

On-Line Librarian Updated

MEMPHIS, Tenn. — An on-line audit trail for source code libraries that is said to track library changes and who made the change is available in a new release of Marian, the on-line librarian from Computer Software Unlimited.

While earlier versions of the software offered ways to isolate problem-causing program changes, Release 4.0

also reportedly provides for summaries of program changes in management reports as well as on-line displays.

Another improvement to the audit trail is the addition of session codes to the librarian's capacity to isolate member changes by date or date range. Marian, which runs on IBM 360, 370 and 4300 equipment, costs \$8,000.

Rental and lease-purchase plans are available from 1806 Malabar Drive, Memphis, Tenn. 38138.

Financial System Aims at Hospitals Using IBM 4300s

NEW YORK — Health Information Systems, Inc. (HIS) has announced the availability of its customized financial information management system for users of IBM 4300 systems in hospital data processing systems.

The HIS system includes registration, admission, discharge and transfer, inpatient and outpatient billing and accounts receivable management, accounts payable, management, general ledger, fixed assets, forecasting and modeling, purchasing and materials management and payroll and personnel components. These reportedly are integrated into an in-house computer system and were designed to manage the financial administration of a health care facility.

The HIS system for IBM computers reportedly is compatible with all standard IBM operating systems and will be available for the 4300 series in the fourth quarter of 1982.

It is said to be compatible with the IBM Patient Care System and can be interfaced to IBM's IMS-DL/1 data base management systems and other existing data base systems.

The entire system can be developed for between \$1 million and \$2 million, the vendor said, noting that the cost is based on the types and extent of modifications required.

Further information is available from HIS at 4522 Fort Hamilton Pkwy., Brooklyn, N.Y. 11219.

Survey Analyzer Enhanced

EAST LANSING, Mich. — Standard Research, Inc. has announced enhancements to the Prime Computer, Inc. and IBM System/34 versions of its market survey analysis tool.

Release 2.2 of RPX Tab is said to contain extended cross-tabulation and frequency capabilities as well as new multiple-response features.

RPX Tab is available for single-site lease or through time-share access. Purchase price for the Prime version is \$15,000; \$7,000 for the System/34 version, the vendor said from P.O. Box 151, East Lansing, Mich. 48823.

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*A program product of the IBM Corporation

'Adam' Targets DEC 'RMS,' Allows Simultaneous Access

WRENTHAM, Mass. — World-Wide Computer Resources Ltd. has introduced a software package described as an alternative to Digital Equipment Corp.'s Record Management Services (RMS).

The Advanced Data Accessing Method (Adam) reportedly allows the same collection of records to be accessed in several ways simultaneously. Furthermore, by including within a program only those procedures required for an application, Adam will reportedly use less code than would traditional methods.

The Adam user reportedly can create files, create new accessing paths, maintain records and check on the

status of files and their structure.

Aimed at the DEC CTS-300 and CTS-500 operating system and VAX/Dibol language user, Adam costs \$2,000. The vendor is located at 15 Trafalgar Square, Wrentham, Mass. 02093.

'Diskit' Gets Enhancements

LOS ALAMITOS, Calif. — Software Techniques, Inc. has introduced the latest version of Diskit, the disk management tool kit for users of Digital Equipment Corp.'s PDP-11 system running under RSTS.

Diskit Version 5.0 is comprised of five software products and reportedly includes:

- A disk structuring utility that is said to optimize disk directories and improve system performance.
- A high-speed directory reorder program that improves system performance by reducing the number of disk accesses required to find and retrieve files.
- An ultra high-speed directory (DIR) utility said to search directories at the rate of 400 files/sec. DIR reportedly supports all of the functionality of DEC's Direct and can be used as a replacement for Direct in all applications. According to the vendor, DIR provides a number of features not found in Direct, including tools for improving system security.
- A disk utility subroutines package that reportedly allows system managers to develop their own special-purpose disk utilities.
- An open files display program that monitors file accesses on a job-by-job basis.

Diskit Version 5.0 is licensed for single CPUs for a one-time fee of \$1,350. Multi-CPU, OEM, educational and quantity discounts are available. Software Techniques is headquartered at Suite 101, 5242 Katella Ave., Los Alamitos, Calif. 90720.

'Ezlog' Extends VAX Log-In

GOLETA, Calif. — Signal Technology, Inc. has announced a user-oriented software extension to the Digital Equipment Corp. VAX/VMS log-in procedure, which reportedly allows the user to specify the project or cost center to charge for the log-in session or batch job.

Called Ezlog, this product also features an optional second level of password protection and records unsuccessful log-in attempts. Other features include the ability to delegate project access to account managers, and disk files can be separated by project or user.

The one-time single-CPU license for this product is \$2,200, which includes documentation, installation procedure, one year of maintenance and periodic updates. Licenses for additional CPUs are available on an unsupported basis for \$1,320. The vendor said from 5951 Encina Road, Goleta, Calif. 93117.

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'FSC-EPS' Debuts for Wang Minis

WINDHAM, N.H. — EPS Consultants, Inc. has announced that its FSC-EPS decision support system is now available for the Wang Laboratories, Inc. VS/50 through VS/100 minicomputers.

The package features financial modeling, "what if" scenarios, simultaneous equation solution, forecasting, editing and advanced programming capabilities.

In addition, the Wang VS

version features user-defined commands and functions and increased capabilities for screen formatting.

The package costs \$43,000, the vendor said from 1 Industrial Drive, Windham, N.H. 03087.

'Control' Package Enhanced For Wang VS Processors

GARDEN CITY, N.Y. — Loud Consulting Corp. has enhanced its Control portfolio accounting, evaluation and management package for Wang Laboratories, Inc.

VS series processors.

The three major enhancements are provisions for accounting in foreign currencies, accounting and reporting on commodity transactions and a tax work sheet to convert foreign currency trades to dollars and to calculate the currency swing for economic gains or losses, the vendor said.

The enhanced package costs \$35,000 for a one-time license fee.

Loud Consulting Corp. is located at 666 Old Country Road, Garden City, N.Y. 11530.

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Kurzweil's 'Kdem' Gets Training Enhancements

CAMBRIDGE, Mass. — Kurzweil Computer Products, Inc. has announced several software enhancements for its Kurzweil Data Entry Machine (Kdem), which reportedly scans and converts to digital code 200-plus typewritten styles in common use.

Among the improvements offered is one that reportedly reduced by 50% the training time for new documents on the turnkey machine. In the new easy mode, the system automatically trains itself to recognize most of the characters in a new document without operator intervention. The software also permits the operator to call a list of "confirmed" characters onto the video screen at any point during the training, according to the vendor, so that the operator knows when the training is finished.

The new software is available on all new Kdem systems, which are base-priced at \$59,000 and range upwards to \$89,800, the vendor said from 185 Albany St., Cambridge, Mass. 02139.

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Micro Notes

Phase One Systems, Inc. has introduced **Oasis-16**, said to bring multiuser capability and business applications to the IBM Personal Computer. The software costs \$1,495 from Phase One at Suite 830, 7700 Edgewater Drive, Oakland, Calif. 94621.

Also for the IBM Personal Computer is a word processing software package from Lifetree Software, Inc. **Volkswriter** is written in Pascal and requires 64K of memory, one disk drive and Microsoft, Inc.'s MS DOS operating system for operation. **Volkswriter** costs \$195 from Suite

342, 177 Webster St., Monterey, Calif. 93940.

Aston-Tate has released an enhancement to its **dBase II** relational data base management system. **ZIP** is a screen builder and report generator that runs on Ascii and Ansi terminals and 8-bit 48K micros under Digital Research, Inc.'s CP/M. Said to allow the **dBase II** user to bring up applications more quickly, **ZIP** is free to users of **dBase II**, which costs \$700 from 9929 W. Jefferson Blvd., Culver City, Calif. 90230.

Lifeboat Associates, Inc. has an-

nounced an Intel Corp. **8086 Software Library** designed to run on the IBM Personal Computer and on other 8086 computers running Micro-soft, Inc.'s MS DOS. Included in the library is **Lifeboat's Emulator/86**, the Digital Research, Inc. CP/M-86 emulator that allows CP/M-86 software to be run on the IBM Personal Computer with DOS. **Emulator/86** costs \$75. DMA, Inc.'s **EM80/86**, allowing execution of CP/M-80 programs on the IBM Personal Computer under DOS, costs \$200 from Lifeboat at 1651 Third Ave., New York, N.Y. 10028.

Standard Computer Systems has announced the availability of a package called **Emulator II**. The package was designed to enable Apple Computer, Inc.'s Apple II microcomputer to act as a conversational CRT with Microdata Corp.'s Reality minicomputer series and other systems based on Pick & Associates, Inc.'s Pick operating system, the vendor said. The package is available at the introductory price of \$250 from the vendor at Suite 255, 10300 Sunset Drive, Miami, Fla. 33173.

RR Software has announced an Ada compiler for IBM's Personal Computer. The Ada subset, called **Janus**, reportedly runs and produces code for its host machine. The package requires 96K bytes of memory, two disk drives and the Digital Research, Inc. CPM/86 or 86-DOS operating systems. The compiler costs \$400. It is also available for 8-bit CP/M-80 based systems for \$300. A user manual costs \$25, according to the vendor at P.O. Box 1512, Madison, Wis. 53701.

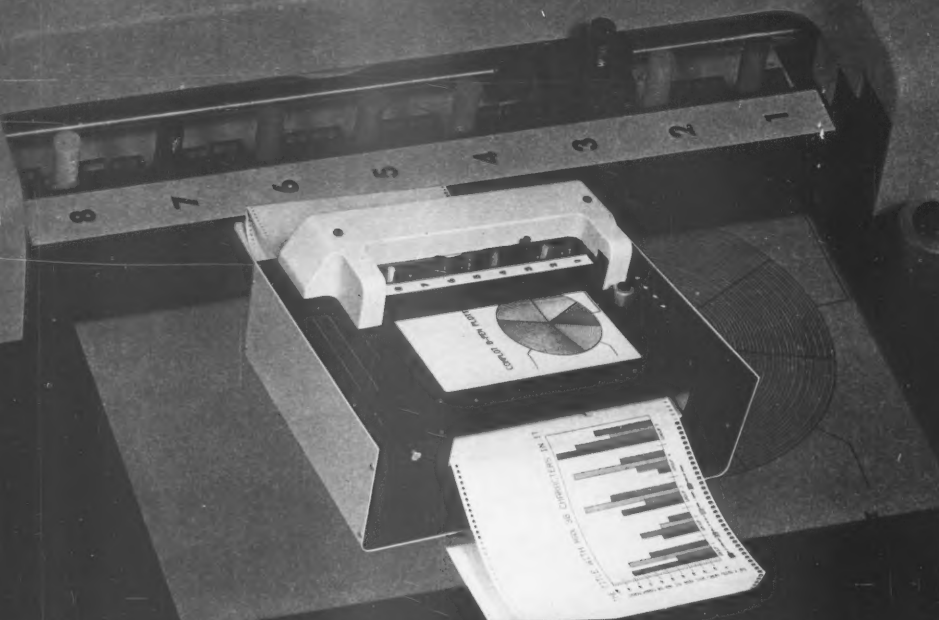
Intelligent Systems Corp. has announced an **Intelligent Graphics System** for the firm's 8000R and 8300R series terminals and desktop microcomputers. The model 8301R terminal costs \$3,490. A CP/M-based desktop processor, the Model 8063R with dual 8-in. disk drives and 64K bytes of memory costs \$5,700. A graphics desktop workstation with plotter and digitizer costs \$11,880, and a graphics desktop workstation with ink-jet printer costs \$11,770, the vendor said from Intecolor Drive, 225 Technology Park/Atlanta, Norcross, Ga. 30092.

Apple Computer, Inc. has announced **Quick File III**, a filing package that manages small to medium-size collections of information on the Apple III processor. The package allows users to design forms to special needs, to access many records simultaneously and communicate with the firm's Apple Writer III or other Ascii character files. The package costs \$100, the vendor said from 20525 Mariani Ave., Cupertino, Calif. 95014.

Hayden Book Co., Inc. has announced **Pie Writer**, a word processing package for Apple Computer, Inc. Apple II processors. Based on an earlier package offered by Hayden, the program includes enhancements such as a machine buffer and multiple tabbing capabilities. The package also features improved documentation including an index. The package costs \$149.95, the vendor said from 50 Essex St., Rochelle, Park, N.J. 07662.

Hourglass Systems has announced three software programs for Digital Research, Inc. CP/M and North Star systems. **Fast Figure** is a spreadsheet program that runs on 46K and costs \$110. **Market Time**, a decision assisting tool for investors, requires 34K of memory and costs \$70. **High Yield**, a mutual fund investment management tool, runs on 38K and costs \$70 from the firm at P.O. Box 312, Glen Ellyn, Ill. 60137.

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Vendors' Decision To Endorse Protocols Developed by Ecma Taps Mixed Feelings In 802 Committee

Maris Graube, chairman of the IEEE 802 Local Area Networks Standards Committee, is "overjoyed."

Kenneth G. Bosomworth, president of International Resource Development, thinks it might not matter.

Other 802 Committee members are undecided.

The event that failed to unify their opinions is a recent announcement by 19 vendors — only six of them U.S.-based — to endorse a set of Ethernet-compatible local-area network protocols developed by the European Computer Manufacturers Association (Ecma) [CW, July 5].

Asked if the announcement amounted to a willingness by vendors to bypass the 802 Committee in favor of quicker results, Graube replied in the negative. "It certainly lends weight to what we're doing," he commented. "If we already know we have support in Europe and Japan, then we're well on our way to achieving an interna-

tional standard."

The Ecma and 802 positions are "very close together," according to Graube. He said the only difference the two organizations have is a minor one having to do with data security.

In the Ecma scheme, it is remotely possible that a single bit error introduces a non-detectable error, the chairman said, adding that 802 maintains there is a different technique to correct for that and Ecma asserts it is not worthwhile.

Ecma and 802 have worked closely together on the protocols, attending each other's meetings and exchanging documents. "What we're really trying to do is achieve international standards for local-area networking and that's what's happening," Graube declared. "If we've been a party to it, that's a feather in our cap."

When Bosomworth was asked if the 802 Committee would perceive the vendors'

(Continued on Page 46)

Contelnet Said to Fit Multiple Vendors

GREAT NECK, N.Y. — A local-area network designed to interface with multiple vendors' equipment was announced recently by Contel Information Systems, headquartered here.

The standard version of the Contelnet reportedly employs baseband transmission, but the system can be changed to broadband by installing a new circuit board in the bus interface unit (BIU) and adding amplifiers to the cable, the company said. Other key features of Contelnet:

- The network can operate at 2M-, 5M- or 10M bit/sec in either baseband or broadband mode.

- The standard version of Contelnet employs Carrier-Sense Multiple Access/Collision Detection, but token passing can be implemented "with certain software modifications."

- Up to five subnetworks can be supported by Contelnet in the broadband mode.

- Gateway connections to Ethernet, as well as to packetized and analog long-distance net-

works, are provided.

The network is said to consist essentially of a single coaxial cable that interfaces with user stations through BIUs; a network control center that performs diagnostic/maintenance functions and manages downline loading, upline dumps, network reconfiguration, display control and related chores.

The cable has a bandwidth of 295MHz and reportedly is divisible into 6MHz channels; each of which can support 255 nodes. Up to 64 virtual circuits can operate through each node.

The four-port model of the Contelnet BIU is priced at \$2,000 in its simplest baseband configuration. Other BIUs are priced below or above that fig-

ure, depending on the number of ports to be served and the characteristics desired. Prices for the net control center start at \$15,000, including software.

Contel expects to begin installing the first Contelnets in the fourth quarter of this year, a spokesman said from 130 Steamboat Road, Great Neck, N.Y. 11024.

For IBM System/34, 38 Users

Terminal-Switching Software Debuts

SAN JOSE, Calif. — Systar Corp. has unveiled remote terminal-switching software for users of IBM System/34 and /38 computers.

The Network 34/38 reportedly allows those users to create networks of IBM 5251 terminals and printers capable of accessing any of up to seven different host System/34 or /38 computers connected to a single Network 34/38.

The remote terminal-switching system is a communications front end that runs on an IBM Series/1 minicomputer. It re-

portedly supports up to seven multidrop leased-line networks of 5251 terminals and printers. Each terminal or printer user selects the desired host computer system from a menu presented by the device and proceeds to sign on to the host in the usual manner.

Users may switch from host to host and will appear as normal, active or inactive workstations in a multidrop private-line network. Network 34/38 is Systems Network Architecture-compatible and no changes to application or system software

are required, the vendor claimed.

It can be combined with Systar's Gateway 34/38 for access to System/34 and /38 computers from Ascii asynchronous terminals such as the IBM 3101, Texas Instruments, Inc.'s 940 and IBM's Personal Computers.

Network 34/38 is available for a one-time license fee of \$40,000, which includes support for multiple hosts and networks and network control, Systar said from Suite 208, 1762 Technology Drive, San Jose, Calif. 95110.

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Financial Institutions Get Modular Service Stations

DAYTON, Ohio — NCR Corp. has announced a series of modular administrative and teller service stations — the Branch Automation System (BAS) 5000.

Designed for financial institutions, the modular units include a branch processor, two controllers, three screen-based displays, three keyboards, three printers, a personal identification number key pad and a magnetic-strip card reader.

The firm also announced the Transaction Management Executive, a specialized operating system for the series.

The BAS 5000 can operate with

previously released NCR self-service automated teller machines and the firm's line of item processing systems, a spokesman for the vendor said.

System prices vary according to modules selected. A typical configuration with a 12-in. CRT terminal, an 111-key alphanumeric keyboard and letter-quality printer costs \$5,700. Configurations for teller stations using a 9-in. CRT terminal, a 44-key printer and a journal-validation printer costs \$4,300. Deliveries are slated for the second quarter of 1983, the vendor said from Dayton, Ohio, 45479.

“The proliferation of financial planning languages will create chaos throughout corporate management ranks. In the future, we will see one standard modeling language that extends from the personal desk-top computer to the central corporate information center.”

Dial-Up Networks Get Bell-Compatible Modem

ROCKVILLE, Md. — The Data Communications Division of Penril Corp. has introduced a Bell Laboratories, Inc.-compatible modem, which reportedly operates at 2,400 bit/sec. for use on the dial-up network.

The Penril 8201 DN modem reportedly conforms to CCITT Recommendation V-26 and provides backup operation at 1,200 bit/sec. The modem can be directly connected to the public telephone network, operates half-duplex or simplex and was designed to directly interface with Penril's 8801C Automatic Calling Unit. The 8201 DN is equipped with a scramble/descrambler, an equalizer to improve operational performance and

diagnostics to isolate fault conditions, the vendor said.

It lists for \$895 in single quantities. Penril is located at 5520 Randolph Road, Rockville, Md. 20852.

Ecma Protocols Gaining Support

(Continued from Page 45)

action as a slap in the face, he replied, “I think the IEEE 802 Committee must be sufficiently accustomed to slaps in the face at this point in time so that this particular slap in the face won't be particularly noticeable.”

He said that the committee's decision not to adopt the Ethernet protocol was “pretty childish” and went on to say that the entry of IBM and AT&T into the local-area network market may render the 802 Committee's work meaningless.

As he put it, “IBM doesn't have any intention of going along with anybody else's standards. They've published enough of their baseband standards to make that quite clear.” Owing to political reasons, there is no way AT&T would use the same standards as either IBM or Xerox, which sells Ethernet, he added.

What the announcement made clear is that there are now three important standards, he said: two unannounced ones from IBM and AT&T and the emerging Ethernet/Ecma offering.

Charlie Bass, vice-president of Ungermann-Bass, Inc., thinks time is running out for the 802 Committee. Ethernet-compatible large-scale integration interface chips will be out this July, and the committee had better endorse Ethernet or come up with a compelling reason not to, he said.

As far as IBM and AT&T are concerned, according to Bass, Bell may adopt either an IBM or Ecma/Ethernet local-area network technology. “Ecma/Ethernet may not even counterbalance IBM, but it will be devastating to any splinter position,” he commented.

Paul Weinwright, who has been working on internetworking aspects with the 802 Committee, said that body has tried to be in as close agreement with alternatives to its work as possible. The committee will probably try to come in line with the Ecma standard, he noted.

“I would think we would try to work together to have a compatible set of standards,” he added.

Robert Donnan has been working on token-passing ring topology problems with the 802 Committee. He called the vendor/Ecma announcement “interesting.” He was uncertain if it indicated a willingness by the vendors to scrap the committee's efforts.

Donnan said Ecma has moved forward on standards faster than the 802 Committee because it represents a smaller constituency of only 15 companies. “If I were an Ethernet-type-of-guy and here was a standard that was now in place, and if it fit what I wanted to do, I would stand up and support it,” he said.



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Tektronix Enhances Models 4052, 4054

BEAVERTON, Ore. — Tektronix, Inc. has introduced enhancements for its Models 4052 and 4054 graphics desktop computers that are said to make them more useful in scientific and engineering environments.

The new versions of these products, called the 4052A and 4054A, include such features as improved Basic language, more powerful general-purpose interface bus and high-resolution, 11-in. by 19-in. direct-view storage tube displays.

The firm has also introduced an Extended Memory File Manager, which sup-

ports the 4050 Series. A random-access memory option, the file manager reportedly has a capacity of 256K bytes or 512K bytes. The options allow up to nine data files to be open for access. The device supports sequential or random access to Ascii and binary program or program segments, the vendor said.

The 4052A is priced at \$9,900; the 4054A for \$20,100; the file manager is priced at \$3,500 for 256K bytes and \$4,500 for 512K bytes.

Tektronix can be reached through P.O. Box 500, Beaverton, Ore. 97077.

Imlac Workstation Runs On Anvil-4000 CAD/CAM

NEEDHAM HEIGHTS, Mass. — Imlac Corp. has announced an Intelligent Interactive Display/Workstation (IID) designed for use with Manufacturing and Consulting Services, Inc.'s Anvil-4000 computer-aided design and manufacturing (CAD/CAM) software.

Imlac's 1600 IID workstation consists of a 19-in. diagonal graphics terminal, a graphics tablet, 192K bytes of random-access memory and 64K bytes of erasable-programmable read-

only memory, plus an RS-232 interface to the host computer.

According to Imlac, the 1600 IID relieves the host computer of most of the interactive requirements of Anvil-4000, allowing the number of terminals supported by a host computer to double, while maintaining instantaneous interaction regardless of the line speed used to connect to the host.

The 1600 IID is available for \$23,700 from Imlac, 150 A St., Needham Heights, Mass. 02194.

System Aids Logic Engineers

SANTA CLARA, Calif. — Calma Co. has introduced a computer-aided design system for logic engineers. The Engineering Workstation offers a full virtual-memory system that supports multiwindow processing and full-screen viewing with user-definable windowing capabilities.

The system also has a hierarchical data base to allow design and functional graphics that

support on-screen menus and help files. It includes networking capabilities that allow designers working on a schematic design to access the same data.

A two-node configuration costs \$135,000 for two 32-bit computers, each with 1M byte of virtual memory, a 19-in. black-and-white display terminal and a 1.2M-byte floppy diskette. Calma is at 5155 Old Ironsides, Santa Clara, Calif. 95050.

University Sidesteps Inflation by Operating Nonprofit DP Center

PULLMAN, Wash. — Tight budgets and rampant inflation are everyday facts of life for most schools. And the impact is felt not only in the classroom, but also in each institution's data processing center, which has difficulties expanding, adding new equipment and licensing software to meet user demands.

One institution — Washington State University, based here — has found a way to avoid this financial dilemma. In fact, its local computer center is able to serve not only the academic and administrative computing needs of the university, but numerous federal, state and local agencies as well.

Considered to be one of the most powerful public information processing systems in the Pacific Northwest, the computing service center's user community consists of 75 different agencies and institutions tied together by several thousand miles of dedicated communications lines.

Key Factor

A key factor in the center's success is that it has operated as a nonprofit cost center within the university structure for the past nine years. For the previous 13 years, it operated as just another school department. It generated no revenue and required annual funding, Ted Krebs, the center's associate director, said.

"We wanted a computing facility we could grow with, one that would serve all our needs for the foreseeable future, but which had enough capacity to service nonuniversity clients and thus fund growth without depending on either the state or the university budget," Krebs said.

This approach to funding has made it possible for the computing service center to upgrade its Amdahl Corp. CPU-based computing facility a number of times over the past nine years — from an IBM 370/67, to a loosely coupled 360/67-65 combination, to an Amdahl Corp. system.

The university switched to Amdahl in 1977 by acquiring a 470V/6-II with 6M bytes of memory. This machine was replaced by a more powerful 470V/8 with 12M bytes of memory in 1980, which is the current system.

The system supports more than 17G bytes of disk memory and operates under VM/SP with CMS. It also offers MVS capabilities.

From offices around the campus and throughout the Pacific Northwest, users have access to the 470 via telephone and direct data lines, Krebs said. They interface with the computer using terminals suited to their own tasks. Output can be either transmitted back to the user site for printout or printed at the center.

Although a nonprofit entity, the center currently operates under the administrative control of the university.

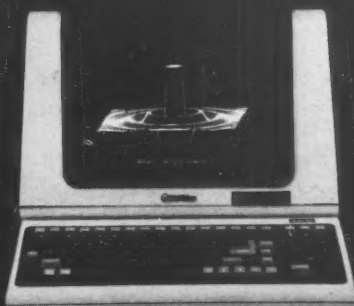
The organization generates an average of \$6 million in revenue each year, with about 55% of its income coming from non-university organizations. All customers are charged on a cost recovery basis, Krebs said.

The center's operation "is not much different than the way motor pools or print shops on most university campuses function," he explained. "Using this financing approach, we avoid going through the normal budget-request processes and all the red tape this implies."

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Remote Item Processing System Captures, Corrects, Communicates

NORRISTOWN, Pa. — A family of remote item processing systems designed to capture magnetic, optical character and optical mark data has been introduced by Scan-Data Corp.

Cheq+Plus, said to process up to 90,000 items/hour, contains hardware and software systems with multiprocessing capability to concurrently capture, correct and communicate data to a remote host computer via IBM 2780 and 3780 protocols.

Various configurations are available, offering from three to 40 pockets, microfilm and ink-jet printing. Software includes capture, proof of deposit, transit, on-line CRT reject correction and balancing.

With software, Cheq+Plus systems begin at \$80,000.

Scan-Data is located at 800 E. Main St., Norristown, Pa. 19401.

Drafting Plotter Also Functions As Digitizer Through RS-232

DAYTON, Ohio — Skalar Systems has introduced a digital read-out drafting plotter that reportedly also functions as a digitizer to transmit X and Y coordinate information through an RS-232 interface.

The Skalar DDM 2001 Digital Drafting Machine may be linked to computers, terminals or computer-aided

Two Subsystems Designed For Bar Code Scanning

EUGENE, Ore. — Western Computer Systems, Inc. has introduced two bar code scanning subsystems target-

ed for those businesses that are using bar codes for inventory control or information tracking.

The Western 240 and Western 340 reportedly can be configured from one to 24 scanning stations using either hand-held wand or tabletop laser scanners.

Several types of bar codes can be read or printed on the systems, a vendor spokesman said.

The systems are reportedly based on a 16-bit microprocessor.

Several disk configurations are said to be available for data storage including 8.5M-, 32M- and 60M-byte Winchester disks or a 90M-byte disk cartridge drive.

Scanning application software is also available, as is a data base management system that allows flexibility in creating assorted programs to manage, organize and access the scanned information, a vendor spokesman said.

The Western 240 is available for \$26,720; the Western 340 for \$30,070, said the vendor spokesman.

Western Computer Systems is located at 1000 Bertelsen Road, Unit 1, Eugene, Ore. 97402.

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BIM-ODIS DOS/VS CICS/VS Status Display

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BIMSERV DOS/VS(E) Library and VSAM Catalog Backup

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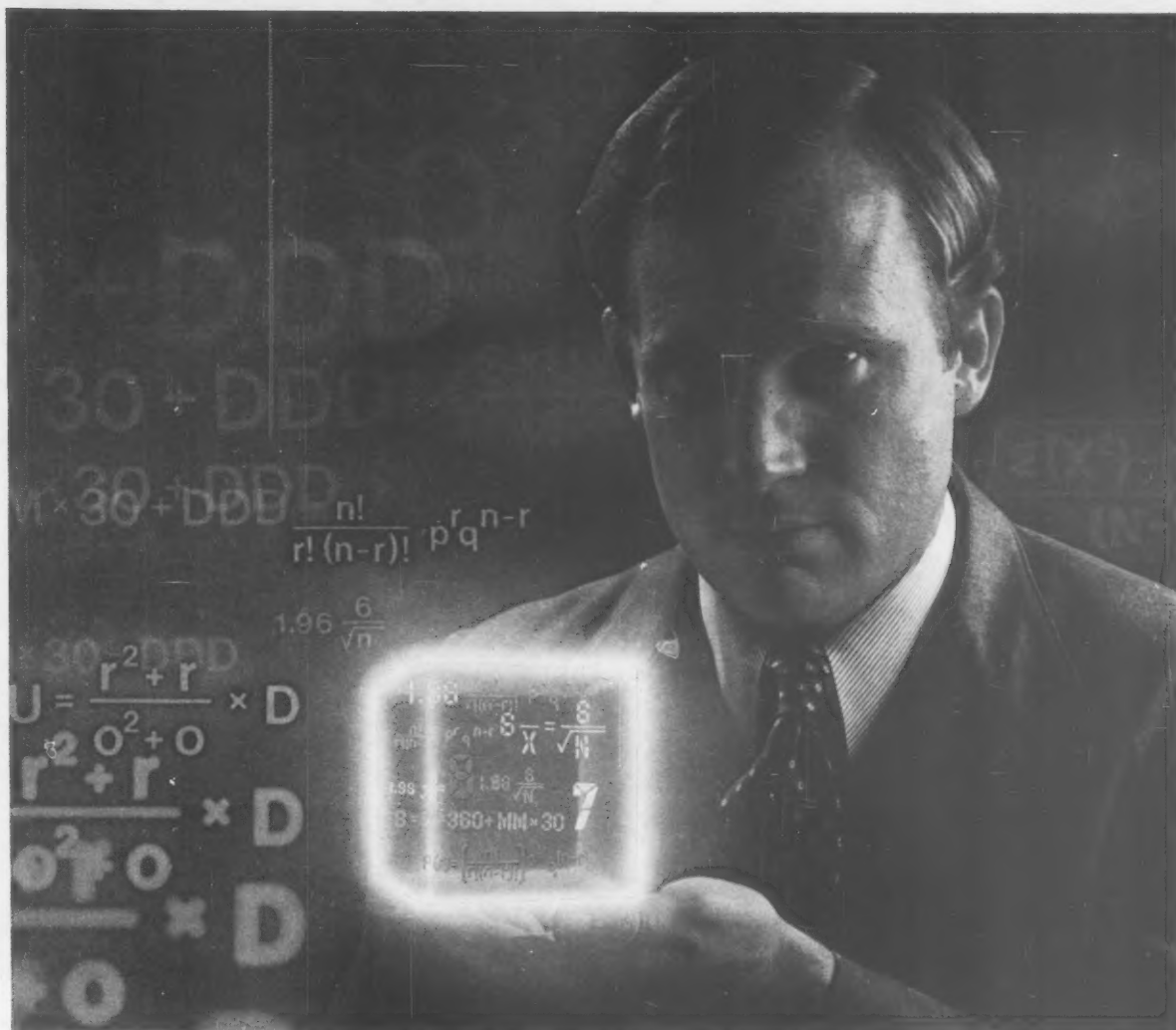
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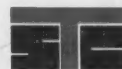
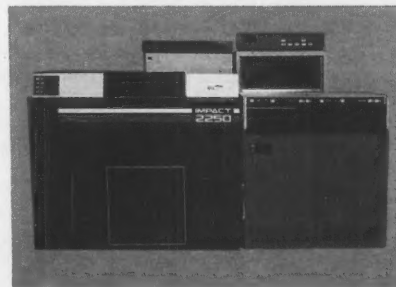
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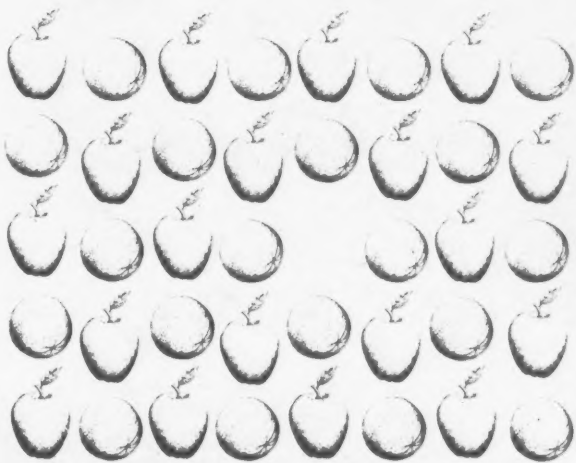
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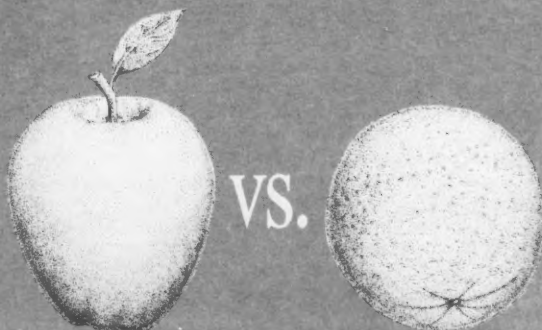
1. Selection



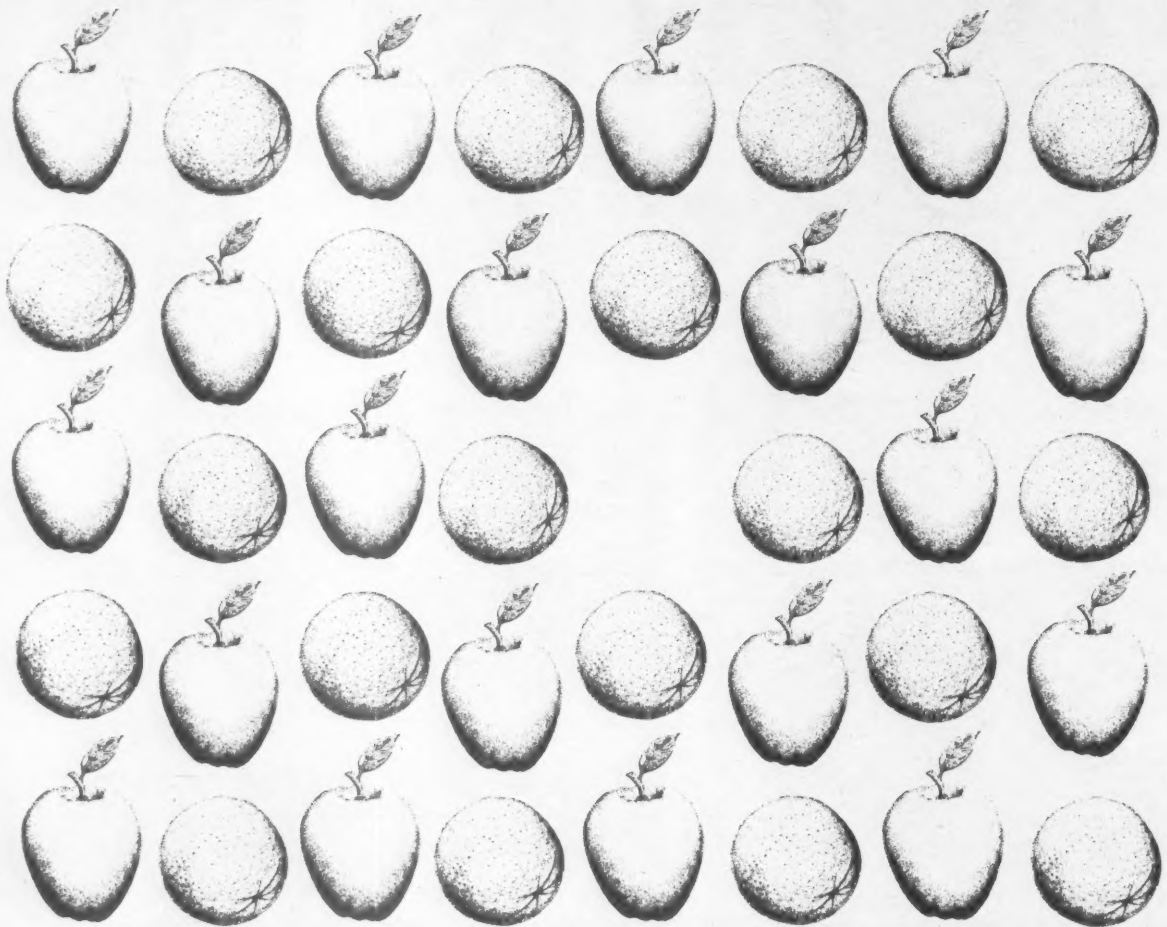
2. Testing



3. Hiring Vs. Training



1. Selection



How to Pick Candidates For Entry-Level Programmer Training

By Bradley Nelson

More and more organizations are considering training their own programmers. This approach has many inherent advantages: it helps overcome the supply-demand problem for programmers and is less expensive than hiring from outside the company. Moreover, by offering attractive career opportunity programs, a company can lower its programmer turnover rate. But how should an organization go about selecting people to participate in an entry-level programmer training program?

This article will pose a number of questions that must be resolved before trainees can be picked and will provide some guidelines for answering them. There will be no attempt to describe the training itself. The questions to be addressed are:

- From which population will I select my applicants?
 - What type of background should the applicants have?
 - How do I know who will be successful?
 - What are the Equal Employment Opportunity (EEO) considerations?
 - Who should take part in developing selection procedures?
- Many of the decisions concerning how to select applicants

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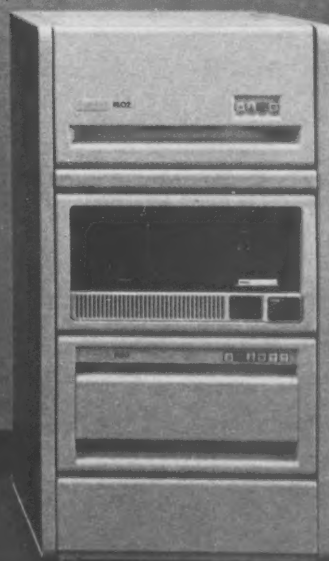
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PICKING TRAINEES

In Depth/6

IN DEPTH

will depend on where you look, either within or outside the company.

Methods for choosing candidates internally can range from singling out someone you know and feel would do well as a programmer to posting the opportunity throughout the company and letting anyone apply. Of course, there are many variations in between.

Applicants from outside the company may be recruited through selective advertising or by working

through particular organizations, such as universities. But regardless of the option you choose, you must weigh the costs (complexity, dollars, EEO considerations) against the benefits (employee morale, application knowledge and so on) of each.

You may find it useful to consult with your employment or employee relations department or someone with EEO knowledge. This input will directly impact other selection procedure decisions.

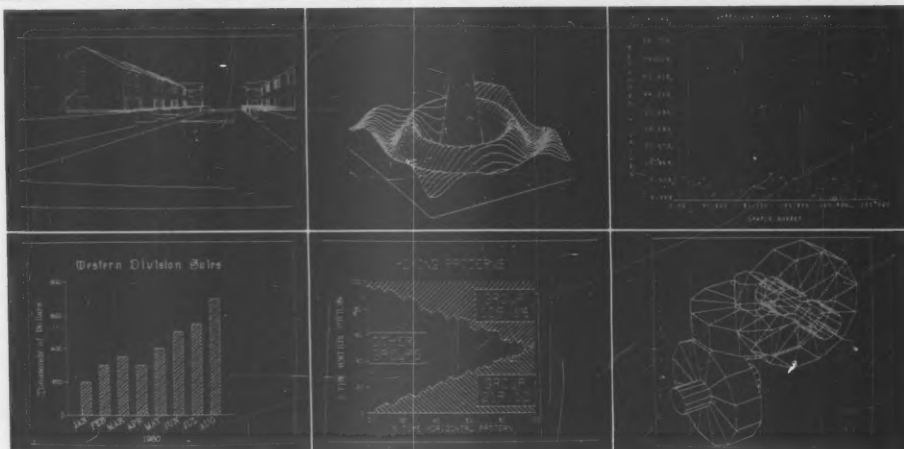
When considering an applicant's background, the primary considerations are the "three Cs": computers, college and company. A true entry-level training program assumes the applicants have no prior knowledge, education, training or experience in computers.

Requirements for such educational background or experience have the effect of eliminating candidates with high potential. For this reason, you should not let prior exposure to data

processing bias your selection, unless that exposure demonstrated a high level of performance.

While a college education is usually considered prerequisite, numerous studies have shown there is no correlation between education and success as a programmer. However, many people feel strongly that an undergraduate degree is very useful. They argue that college grads are a little more homogeneous and that a degree in an application-related area will help a person understand the application and develop his analytical abilities.

After many years of teaching entry-level programmers, I recommend the following: If you want to recruit applicants from a university placement office, go ahead; but don't make a college degree a minimum require-



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Evaluating The Interview

Crocker National Bank, whose interview form is shown on the facing page, evaluates candidates for its programmer training program in each of the following areas. Candidates are scored as "unsatisfactory, acceptable or very good" for each characteristic.

1. Oral Communication: Ability to express oneself clearly; ability to convey ideas, thoughts, information, etc.

2. Flexibility: Willingness and ability to adapt schedule, to respond to emergencies or urgent matters; agreeable to working nights, weekends, overtime.

3. Scheduling: Ability to plan and schedule activities; ability to organize projects, to work on more than one project simultaneously.

4. Reaction to Pressure: Ability to work under pressure, within time constraints and meet deadlines.

5. Initiative: Willingness to learn new things; to suggest and attempt new approaches.

6. Work Style: Desire to work through problems basically on own but to participate and share information with colleagues; able to work without close supervision; willingness to assume responsibility.

7. Interest in and Commitment to Programming: An awareness of profession and career; interested in self-development.

8. Interpersonal Skills: Ability to get along with others — co-workers, supervisors and clients; patience and understanding of others' role and function within system.

9. Problem Identification and Solving: Ability to identify problems, work through potential solutions, assess adequacy of solutions and implement correct solution.

Sample Interview Questions

The following interview questions are used at Crocker National Bank for its internal programmer training program.

I. Career:

1. Why are you applying for this position?
2. Why are you pursuing this kind of career?
3. Why do you want to leave your present job?
4. (a) What are your career aspirations?
- (b) How long do you think it will take to reach these goals?
- (c) What do you plan to do to help you reach them?
- (d) Where does this job fit into your overall career plan?
- (e) What makes you feel that this is the best career path for you?
- (f) How will this job help you achieve your career goals?
5. What special aspects of your work experience have prepared or qualified you for this job?
6. What things about this program have caused you to hesitate to apply?
7. (a) How do you feel about your career at Crocker National Bank?
- (b) What do you feel is the best thing that has happened to you at Crocker National Bank?
8. What might make you leave the job of programmer?
9. What kind of job or position do you see yourself holding two years from now?
10. If you hired a programmer, what characteristics would you look for? Which are the three factors you consider most important? Why?
- How do you rate yourself on the three factors?

II. Motivation:

11. What do you think you will enjoy most about being a programmer?
12. What aspects about becoming a programmer give you the most concern?
13. What would you like to accomplish if you got this job?
14. Most people have strengths and weaknesses as workers. Tell us about your strong points. What are the areas needing improvement?
15. What are some of the things that motivate you to do a good job?
16. When you have been told about, or discovered for yourself, a problem in your work performance, what have you typically done? Can you give us an example?

III. Working Conditions:

17. How much overtime do you

work? How do you feel about working overtime? Nights? Weekends? Holidays?

18. Programmers often must work strange hours under stressful conditions. How do you feel about this?

19. Who sets the pace in your present job? Do you face deadlines or work under pressure?

20. How do you react to disruptions in your regular work such as telephone calls, new assignments, urgent matters, etc.?

21. (a) Under how much pressure do you work best?

(b) Describe the most stressful situation in which you have been involved in your current job. How did you cope/react to the situation?

22. How much variety do you like on a job? How much responsibility would you like? What types of duties would you like to participate in?

23. What kinds of supervision have you received in previous jobs?

If you had to select the best qualities of the supervisors you had, what would they be? What characteristics would you consider least desirable?

24. What kinds of co-workers do you like best? Why?

IV. Experience:

25. Describe your present job. What are your duties and responsibilities? Have your duties and responsibilities increased as you gained experience on the job? If so, how?

26. (a) Can you describe for us one or two of the most important accomplishments in your career? Did you do this mostly on your own or was it a team effort?

(b) Do you prefer to work on a project alone or with two or three others? With a little or no supervision?

(c) Do you like to have a lot of projects going at one time or do you like to concentrate on one project until you complete it?

27. Can you tell us about something new you developed on a previous (or present) job, like a product or procedure that you are particularly proud of?

28. Describe the most important position or project that you have handled in terms of responsibility.

29. (a) I am sure that you were involved in some situation that just did not go right. Could you explain it? What caused the problem? What did you do to resolve it?

(b) What are some of the things you find difficult or frustrating in your present job? What have you done about this?

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PICKING TRAINEES

In Depth/8

IN DEPTH

ment unless you are willing to pass up some top candidates.

There are a number of advantages to selecting applicants from within the company: Such candidates are already familiar with company goals and procedures, the industry and the application, and they will probably be more likely to stay.

This will only be true, however, if the applicants have been with the company for some length of time. Many companies establish a mini-

mum employment requirement, commonly 12 to 18 months.

Who Will Succeed?

The success of an applicant as a programmer depends on a combination of aptitude and other factors. You must be careful, however, when evaluating these characteristics to make sure you stay within the guidelines of the Equal Employment Opportunity Commission (EEOC).

One way to evaluate aptitude is

through a standardized test. EEOC guidelines recommend that each company validate an aptitude test for its population of applicants. (See the article beginning on In Depth/15 for further details on three programmer aptitude tests.)

A number of factors beside aptitude are normally identified as necessary for a programmer. These factors include oral communication, flexibility, scheduling, reaction to pressure, initiative, work style, interest in and

commitment to programming, interpersonal skills and problem identification and solving. These factors can usually be evaluated by a structured interview.

Keep in mind that all interview questions must be job-related. One way to assure this is to do a job analysis of the entry-level position and ask questions that are directly related to the results of the job analysis. An example of an interview developed by San Francisco-based Crocker National Bank using such a process can be found on In Depth/7. This interview form is intended as an example, not as a universal form.

EEOC Considerations

With any type of training program, there are EEO considerations, especially when a particular process is used in selecting the participants. How concerned you are about EEO will determine how much effort and cost you will commit to protect your company against a possible lawsuit. Under ideal conditions, you should involve your internal EEO people from the beginning. You should also hire a validation expert who will:

- Do a job analysis.
- Review the selection procedure to determine if it violates the results of the job analysis.
- Comment on or select the aptitude test (if one is given).
- Use the job analysis to design or to review the design of the interview.
- Do a statistical analysis to determine if there is a high statistical correlation among the selection procedure, success in the training program and success as a programmer. Ideally, lawyers will review the selection process and give their legal opinion or recommendation.

Parties Involved

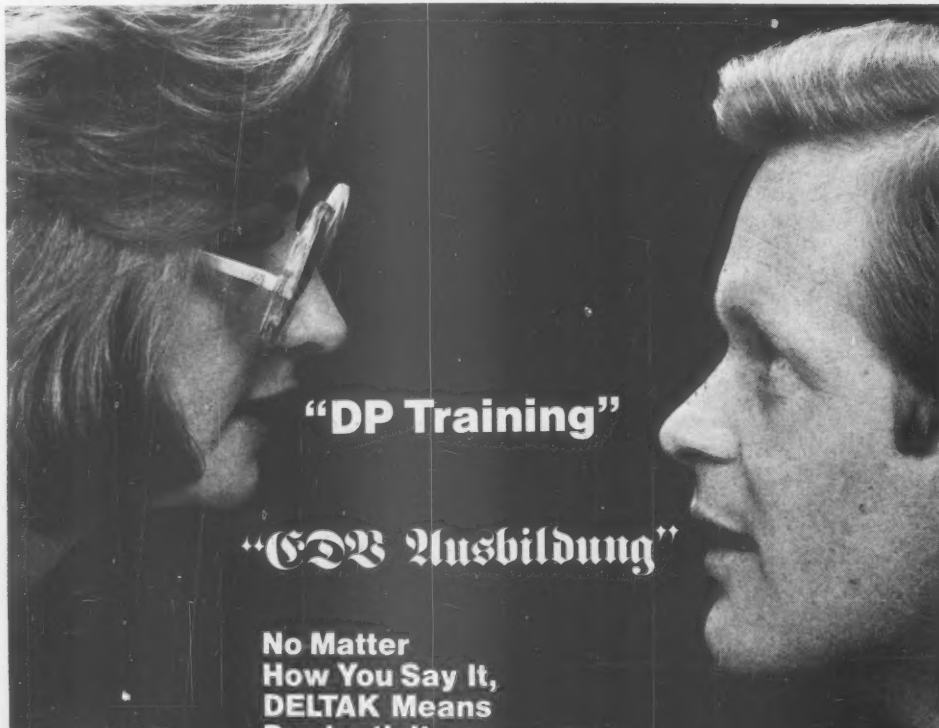
Depending upon the complexity of the selection process you want to use, the following is a complete list of the people who might be involved:

- DP management.
- Employment management.
- Employee relations.
- Company EEO person.
- Company lawyers.
- Validation expert (internal or consultant).
- Aptitude test producer.

The complexity of your own selection process will depend upon how you answer each of the questions in the introduction to this article. Of course, there is no one best way to go about selecting applicants. The best approach is whatever works for you.

About the Author

Bradley W. Nelson is an independent consultant based in Renton, Wash. In the last four years, he has concentrated on the development of entry-level training programs for programmers. Nelson received an M.S. in computer science from Washington State University and a Ph.D. in systems science at Portland State University.



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Components fail. But that doesn't necessarily have to mean downtime. With a NonStop network from Tandem, you're assured of completely reliable system operation—right through a component failure that would shut other systems down. The result is that you get the right information to the right people at the right time. Across the street or around the world. Without fail.

The network is based on the continuous processing capabilities of Tandem NonStop computer systems—a fault-tolerant environment in which a malfunction or component failure will not inhibit or interrupt system operation.

With a Tandem system, you can access information from anywhere in the network, in different formats (text, data and images), integrate all the information in a form that meets your specific requirements, and distribute the finished product at the appropriate times to any number of recipients at any number of locations. Those receiving the communication can 1) interactively add or delete information; 2) forward it to other individuals or send it back to the originator; 3) print it out; or 4) store it for future reference. Or any combination.

And in a Tandem network, all the advantages of NonStop system availability become NonStop network availability. If a line failure occurs, our advanced networking software transmits the message over the optimum alternative path—transparently to the user, of course.

But the result is always the same: your information gets through. Without fail.

DEVELOPING THE INFORMATION

As the nature of doing business on a large scale becomes ever more complex, so does the nature of the information behind it. Not only is this information in many different formats, it is typically widely dispersed throughout an organization. With most systems, that means throughput problems for those users in remote locations who need only occasional access to it.

Not so with Tandem.

The wonders of a distributed, relational database.

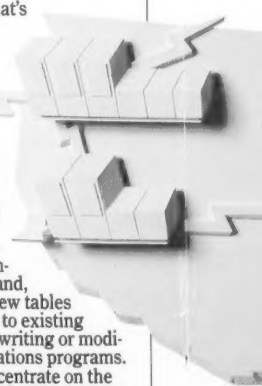
Unlike other approaches to distributed processing in which each location functions as an independent database, Tandem treats the network as one single database with multiple files distributed geographically. Programs will run with files from anywhere in the system, whether you have a single two-processor system or a 255-

system network. And with no user intervention or special programming required.

The key is the relational organization of the database—an extremely flexible design concept that's also extremely easy to work with. Setting up files merely involves creating or filling in tables with pertinent data. So you save time and money right from the start on program development and maintenance. And to expand, you merely add new tables or add more rows to existing ones—without rewriting or modifying your applications programs. This lets you concentrate on the application at hand, not on system organization.

MOVING THE INFORMATION

Most business information systems are configured for the purpose of automating the tasks normally associated with office work: writing, printing, filing and distributing information within a local area.



THIS NETWORK WORKS

Tandem processors complement each other, working together to increase power, performance and throughput for a lower total cost per transaction. Adding NonStop fault-tolerant operation to advanced networking capabilities, the Tandem system virtually eliminates the risk of network failure. At the same time, it protects the database from damage caused by electronic malfunctions. And when a component does fail, the system can be serviced—parts removed and replaced—while continuing to process transactions. So your message

is guaranteed to get through. On time, every time. And over the widest range of communications circuits, too: X.25 packet-switching networks, terrestrial circuits, fiber optics, even satellite links.

The ins and outs of transmitting data.

Tandem's comprehensive set of communications prod-

ucts protects your investment in other mainframe, mini, and peripheral products. The Tandem system supports BISYNC, ASYNC, SDLC and HDLC basic communications protocols. There are also a variety of software packages that allow a network of Tandem systems to be linked to other mainframes or networks (including SNA) for the support of interactive processing and remote batch processing.

In addition, the Tandem system can be interfaced to a wide range of terminal products such as text processors, ATMs, cash registers, badge readers, optical scanners and shop floor terminals.

Words and images.

Tandem's special facsimile software lets you store and forward facsimile reproduction of charts, graphs and diagrams to accompany text from various data files. And, you can access this information

from any telephone with a facsimile machine. What's more, this ability to transmit graphic elements also greatly enhances our unique Query/Report Writer capability—the only such software on the market that optimizes both functions over a distributed database.

The speed of light.

Using state-of-the-art optical technology, our high-speed fiber optics extension provides the means to link Tandem processors up to a distance of 1000 meters between individual systems.

In effect, you can link up to 224 processors within your headquarters or plant, giving you an extremely fast and efficient system that provides enormous processing capability. And of course, you can interconnect this system into your network for expanded information-sharing capabilities.

The sky's the limit.

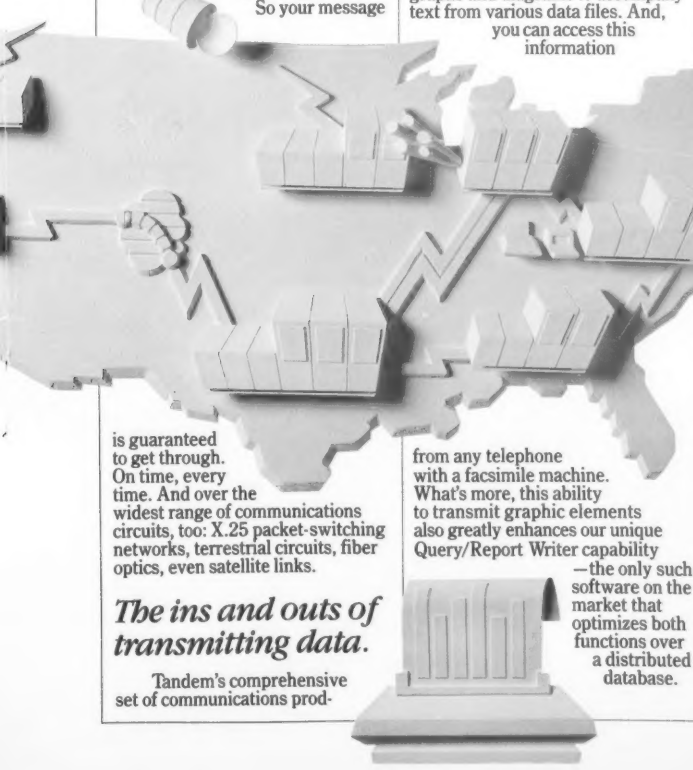
The lower costs and higher reliability of transmitting data over long distances via satellite is an economical and practical alternative for any corporation with geographically dispersed locations.

That's why Tandem has joined with American Satellite Company (ASC®) in a unique marketing agreement to provide the only completely fault-tolerant satellite communications network on the market today. So you can be assured of total NonStop system reliability, from operating system to orbiting satellite.

Following the NonStop system strategy, earth stations transmit and receive data over two parallel paths—if one is down, the other is still operational.

Also, ASC provides two different transponders on the satellite itself. Again, should one be inoperative, the second transponder and data path continue to function.

ASC provides the earth stations, including a special antenna that is small and light enough for mounting on a rooftop or in a parking lot. This can be directly connected to the computer system, without need of leased lines, for lower costs and





higher dependability. Tandem supplies all other ground components, including controllers, RF modems and complete computer/communication interface modules, all of which were designed with solid state technology for outstanding reliability. And, since Tandem maintains the entire system, you always have only one number to call for the answer to any question.

Putting it all together.

With a full range of communications capabilities and the enormous capacities of a global system, the Tandem NonStop™ network is uniquely suited to the complete information requirements of multi-divisional, multi-national corporations. And most especially for any business or institution that needs to get the right information to the right people at the right time. Without fail.

THE TANDEM EVOLUTION

- A single system.
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- A single database.
- A single operating environment.
- A single network architecture.
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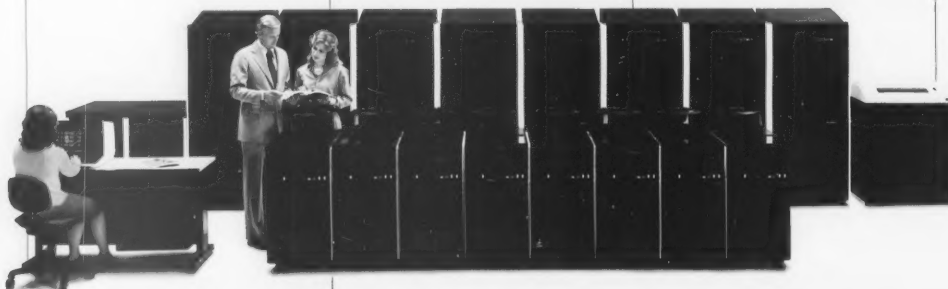
The Tandem Evolution—an evolution in products and strategy that integrates information and communications in a single virtual NonStop system. A system with the flexibility to adapt as time, markets or economic considerations change. A reliable network that links people, equipment and data independent of location, application, form

of data, method of transmission, number of users or types of equipment. An evolution that from beginning to end protects your investment in information resources.

The Tandem Evolution—a consistency in philosophy that's designed to give users the optimum in computer performance right now. While providing a continuing, flexible framework for enhanced performance tomorrow.

Tandem provides local sales and service support in the major computer markets throughout the free world. Plus fourteen software education centers in the U.S., Canada and Europe offering professional technical training courses for your programmers and analysts. With this kind of support behind each new capability, applications can be implemented on-line quickly, easily and economically.

If you'd like more information, call your local Tandem sales office listed on the back cover. Or contact Tandem Computers Incorporated, 19333 Valico Parkway, Cupertino, California 95014. Toll Free 800-538-3114 or (408) 725-6000 in California.



The system shown is a sixteen processor system. It can function independently or as the local node of a 255-system network, more than 4,000 processors, providing direct and immediate access to information sources anywhere in the world.

When you need it without fail, there is only one.

TANDEM

But communicating this information in a timely, reliable manner outside that area is another problem entirely. If you don't know beforehand precisely which locations are to be included in your network, you'll pay a stiff penalty in reprogramming and restructuring costs when you want to add nodes or change them around.

That's where the Tandem difference is so important.

Rings. Strings. Stars. Or any combination.

The Tandem system was designed from the start to be a single, flexible network. No matter what the configuration. Or how many times you change it. A simple two-processor system at one physical location may be thought of as a

network, just as a 255-system configuration spread across the globe is a network. The very same network, at that. This concept of a *total* information/communications system results in significant time- and cost-saving benefits for the system designer. And ultimately, for the user.

Plenty of room to grow.

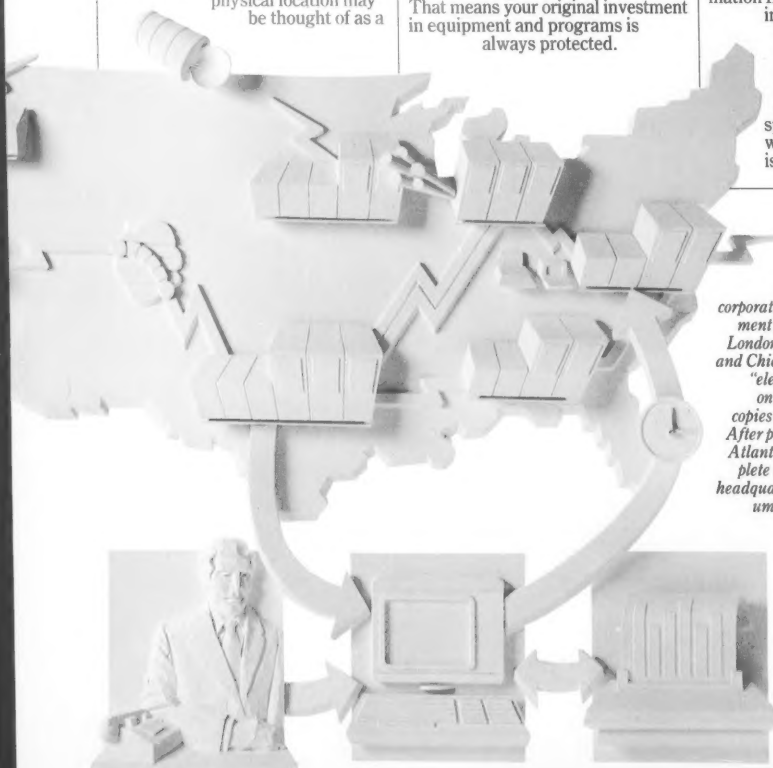
System expansion is easy and economical. Thanks to the network's modular construction, moving up to larger configurations is simply a matter of adding hardware, piece by piece, as requirements dictate. You start only with what you need, and add processors, peripherals and communications facilities in low-cost increments. And without having to rewrite a single line of software. That means your original investment in equipment and programs is always protected.

The right information to the right people at the right time.

The Tandem NonStop network integrates all devices into a single virtual system. This provides a framework for information handling that is independent of both content and



time. Each user can send, query, receive, store, secure, forward and distribute information at his or her own terminal. Including information from the database and images from a facsimile machine, and the user's own ad hoc memos. The system assures that the information will reach its destination at the user-specified time. And that's what effective communication is all about.



On a Tandem network terminal in the Dallas office, a sales representative accesses the corporate database to draft a quote document for presentation to a customer in London. Meanwhile, the San Francisco and Chicago offices respond to a separate "electronic memo" by sending charts on the customer's sales activity and copies of faxed news stories and photos. After product inventory figures from the Atlanta warehouse are added, the complete report is transmitted to corporate headquarters in New York, where the document is reviewed and a cover letter drafted. Finally, with a few simple keystrokes, the entire package is sent in seconds to the London sales office, with copies to New York and Dallas for storage on file. Thus, the full resources of the system are put to work for effective corporate information management.

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TANDEM

2. Testing



Pros and Cons of Standardized Aptitude Tests For Programmers

By Howard Karten

For many DP managers and departments across the country, dealing with the shortage of qualified programmers and analysts means developing a supply in-house, via company training programs. But belt tightening, budget cuts and productivity concerns mean training departments are becoming more selective, attempting to admit only the most promising candidates.

In their efforts to select top candidates, managers are making heavy use of programmer aptitude tests. Despite the complexities associated with testing, many training directors are using programmer aptitude tests in a sophisticated way. As a result, most users are happy with them, despite some of the legal pitfalls and complaints that periodically crop up.

Although the tests may be effective, some questions remain unanswered. Some of the legal aspects may not have been fully resolved. Moreover, there may be hidden dangers in testing as a selection method, and overreliance on testing is a constant temptation.

The first programmer aptitude tests in widespread use appeared in the late '50s or early '60s. Among the earliest was a test

APTITUDE TESTS

In Depth/16

IN DEPTH

IBM distributed to its customers. Withdrawn from distribution by IBM several years ago, that test has now been succeeded by three others that account for the bulk of testing today: the Berger Aptitude for Programming Test (BAPT), distributed by Psychometrics, Inc.; the tests distributed by Wolfe Computer Aptitude Testing Ltd.; and the Computer Programmer Aptitude Battery distributed by the IBM subsidiary Science Research Associates, Inc. (SRA).

Despite the fact that IBM has dissociated itself from the test bearing its name, that instrument remains in wide use around the country, principally at smaller installations and computer schools. An IBM spokesman was unable to provide any information about the reasons for discontinuing distribution of the test; IBM uses another test for selecting its own programmers.

For the most part, vendors and test users are satisfied that high scores on

any of the three tests correlate well with good on-the-job performance following training. "An informal study we did found a very strong correlation between good, mediocre and poor performers in a testing and job performance situation," said Psychometrics, Inc. codirector Dr. Frances Berger. "People who performed well on the Wolfe test also did well at job performance, although that test [may incorrectly] weed out some good people, too."

With a large number of applicants for programmer trainee positions, incorrectly eliminating qualified applicants is no problem since there is an ample reserve.

Test users, too, report that people who score high perform well later. But this confidence may not be entirely well placed. Although most validity studies report high correlations, the passage of time and other changes may require continuing studies. "The government in general has not been too kind to people who don't do [validity] studies within their own organizations," according to Dr. Mary Tenopir, manager of employment research for AT&T and a sometime paid government adviser in Equal Employment Opportunity (EEO) testing.

According to psychologist Dr. Victor Howard of the Chicago-based management consulting firm Rohrer, Hibler & Replogle, Inc., "Some managers may overrely on test scores and numbers. Personally, I think managers may be putting too much blind faith on test scores as qualitative and/or quantitative numbers. We advise clients to use common sense in selecting people and to look [as well] at compatibility of employees." Howard's consulting includes advising clients on employee selection.

Validity Study

One ambitious study of test validity was performed several years ago by AT&T and Psychometrics. In that effort, some 350 applicants for programmer jobs were tested and hired without regard to their scores. Job performance was later correlated with scores on the test. The study revealed correlations between .61 and .71 for performance on the job and on the Berger test. "Statistically, that correlation is highly significant [that is, it could not have occurred by chance]. It was more highly correlated than other test instruments used," Berger recalled.

Not all studies are as rigorous or have samples as large. Sandy King, automated systems development training manager at Shawmut Bank of Boston, noted that her training program had tested 200 applicants with the Wolfe tests, selecting 14 who eventually completed the program. "All 14 have received above average or very good ratings in each performance appraisal, and all are still with the company," she noted.

Obviously, the larger the sample size, the more conclusive the results. This leaves smaller employers in a somewhat tenuous position in terms of having the resources (test takers, money) to conduct their own validity studies.

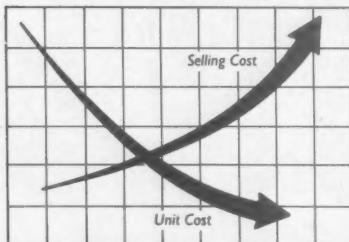
Concern over validity studies leads all three test makers to stress this aspect of test construction and purchase. In the sales literature they send out, Psychometrics, SRA and Wolfe cite several validity studies they have done and the results.

In some cases — whether for rea-

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APTITUDE TESTS

IN DEPTH

sons of professional ethics, marketing or other considerations — some details are sketchy. Psychometrics, for example, cites studies done at Standard Oil of Indiana and Continental Assurance Co., as well as studies at a financial institution and manufacturing firm (neither of which is identified). Wolfe also cites some specific companies and leaves some

superior to anything else we've used. We've used the Wolfe test for 10 years, and we're very happy with it."

Bargerhuff also pointed to the importance of motivation as a factor in subsequent job performance: Indiana has admitted to its training program some applicants with low test scores who were "high on loyalty and motivation," and they later excelled at

"The general rule is that under equal opportunity legislation, you shouldn't give tests unless they measure something relevant to the job."

unnamed.

SRA sends out some reports of validity studies to prospective clients, but does not name them.

None of these three vendors has published validity studies in recognized psychology journals, where the studies would be subject to the scrutiny and criticism of other professional psychologists involved in test construction.

The whole area of programmer aptitude test construction, in fact, has received relatively little attention by academic psychologists or researchers. "I don't know of any of my peers or colleagues or other academics who are spending time on research in this area — and I don't know why, either," notes University of Colorado psychology professor J. Daniel Couger.

No Good Criticism

Although books and critics of standardized testing turn up with near-monotonous regularity, detailed criticisms of the programmer aptitude tests are not to be had. A search of academic psychology journals turned up no such studies; the only critical one came from a recent issue of *Communications of the ACM*. University of Cincinnati computer science professor Larry Mazlack found no significant correlation between scores on the IBM Programmer Aptitude Test and grades of students enrolled in computer science courses. Mazlack concluded that standardized programming tests were not predictive of success in learning programming, at least for college students taking the IBM test.

In a telephone interview, Mazlack noted that he was satisfied his results were valid and "probably" (but not conclusively) applicable to larger populations. "I [doubt] the tests end up testing whatever it is that makes a good programmer," Mazlack said of tests in general.

We were unable to learn of any test users who have dropped their tests or switched to a different instrument. Most of those with whom we spoke echoed Bob Bargerhuff, education coordinator for the State of Indiana's Computer Division. "Our results [with the Wolfe test] are

their jobs. "This test eliminates a lot of good people — low scorers who probably would make good programmers. It doesn't affect us adversely, however," he said.

Understandably, many of those closely involved with programmer trainee selection using aptitude tests are cautious about speaking for publication. Some fear involving their company in lawsuits and EEO actions. These managers look closely at test relevance and supporting data, particularly since a well-publicized 1971 Supreme Court decision, which held that selection tests must be relevant to the job to be performed.

"Users generally don't take the trouble to talk with legal departments of their firms," noted Shawmut Bank's King. "We did, as part of the test selection process. Wolfe has been very cooperative and very willing to supply materials relative to its validation studies." The sizable package of materials Wolfe sends out includes material detailing the test construction process and the legal ramifications of testing. Wolfe stands out in this respect.

All three test distributors emphasize the research backing up their tests. Psychometrics cooperated with AT&T and the operating companies on an ambitious validity study some years ago. SRA also has done studies, but releases few details. And Wolfe, which estimates that it has roughly 1,000 clients, has validation data available in the event of a suit involving its clients or test.

Although test users are cautious in selecting tests and in talking about them, the worst fears they harbor may not be justified. "I have not seen any cases in court regarding programmer aptitude testing; I am aware of none," notes Woburn, Mass., attorney Robert Bigelow, who specializes in the legal aspects of data processing. "The general rule is that under equal opportunity legislation, you shouldn't give tests unless they measure something relevant to the job. I would sure as hell want to see some data on validity [before selecting a test]," Bigelow added.

Some users also have questions about the possible dangers of selecting applicants who score too high on tests. Most employment managers

Test Vendors & Prices

Three vendors account for the bulk of the activity in programmer aptitude testing. The following price information was valid as of July 1.

Science Research Associates, Inc., 155 N. Wacker Drive, Chicago, Ill. 60606, (312) 984-7000. SRA, an IBM subsidiary, sells the Computer Programmer Aptitude Battery. A package of five reusable test booklets costs \$38; a package of 25 answer sheets costs \$18.40; the examiner's manual, \$4. Users score these tests themselves.

Psychometrics, Inc., 2800 Olympic Blvd., Santa Monica, Calif. 90404, (213) 829-0248. Psychometrics sells two tests: the Berger Test of Programming Proficiency for experienced programmers and the Berger Aptitude for Programming Test. The former costs \$20 per test including scoring; the latter costs \$25 each for the first 100 copies purchased by one customer, with the next 50 at \$20 each. Psychometrics will also administer the

aptitude test at its headquarters for \$25. It takes 90 minutes, and a written report of scores is mailed to clients.

Wolfe Computer Aptitude Testing Ltd. Wolfe may be reached through Box 319, Oradell, N.J. 07649, (201) 265-5393 (or Box 1104, St. Laurent Station, Montreal, Quebec, H4L 4W6, Canada). Wolfe sells several tests, including the Wolfe-Spence Programming Aptitude Test and the Wolfe Programming Aptitude Test, both of which cost \$35 each. The Aptitude Assessment Battery: Programming costs \$80.

The company also sells other tests for operators, systems analysts and systems programmers. Discounts are available for quantity orders of \$1,200 or more.

Some tests are available in languages other than English. Scoring on some tests also includes written evaluation of test applicants based on analyses of the completed tests.

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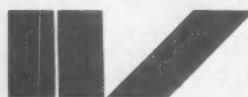
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IN DEPTH

are wary of hiring over-qualified people who may become bored. The primitive facilities of early computers made intense intellectual demands of programmers, leading early DP managers to hire only "the best and the brightest." In many quarters, that desire for the cream of the crop continues and may be mistaken.

One DP manager at a New York City insurance firm reported that his company is leery of hiring applicants

with too good a college or performance record. "We have a feeling — based on limited experience — that we'll spend thousands to train them, and six months or a year later, they'll take off for more excitement," he said.

King also recalled that one of her former employers used the IBM test and noticed that "people with a high score are more inclined to build a better mousetrap, and they became dissatisfied sooner." In her selection

efforts, King now concentrates on getting a "well-rounded individual" who is oriented toward getting the job done, rather than "seeking esoteric ways of doing things."

The data on this question remains more anecdotal than conclusive. Many employers still try to get the smartest candidates they can. "I've heard that story [about over-bright applicants] for the last 25 years, but I have never seen one shred of scientific evidence to support it," AT&T's

Tenopyr remarked.

Another lurking danger is using the test as the sole criterion for selecting applicants. "We advise clients to use common sense in selecting people," Howard said. "There definitely is a place for testing, but it's a controlled place. We advise clients to use common sense in selecting people and to look at the compatibility of a person with what's needed on a job."

Others had similar advice, such as this from employment manager Robert Smith of New England Telephone Co.: "Computer jobs are not just seven-and-a-half hours of banging on a computer terminal. Our systems people have to communicate with others, so interpersonal skills are important. We also look for extra-curricular and civic activities."

Test distributors regard the future of their industry as bright and growing. "Business is increasing fairly dramatically, especially since the Republican victory, and there is more of an emphasis on efficiency, rather than just on equality," said Steve Berke, vice-president for sales at Wolfe in Montreal. Berger of Psychometrics is also confident of the future of testing. "Business is increasing because employers are training their own personnel due to the tight market," she noted.

Other observers are not so sure, however. Couger predicts a decline in the future of testing, driven by EEO-related fears and increasing skepticism regarding test validity. "I know of one large firm that says it can find no correlation between test performance and the performance of their people," he noted. Howard adds, "I concur with Couger. You can have a pretty hard time providing a relationship between testing and success on the job [in the event of a suit]."

In general, however, the future of programmer aptitude testing appears to be stable, and perhaps even rosy. Most users are satisfied with the tests they are currently using. Moreover, the costs are modest enough, particularly when weighed against the possibility of admitting an unqualified candidate. Moreover, no critic has yet appeared to level serious charges against any particular test.

Although some research organizations are reportedly developing aptitude tests for internal use by computer vendors, we were unable to learn of any current efforts aimed at developing new tests for use by computer users. Certainly the costs involved, as well as the potential for legal challenges, would appear to be one factor dampening the enthusiasm of any such would-be test distributor.

About the Author

Howard Karten is a Boston-based freelance writer who specializes in data processing and behavioral issues.

Karten has been involved in data processing for more than 15 years and has done graduate-level work in psychology.



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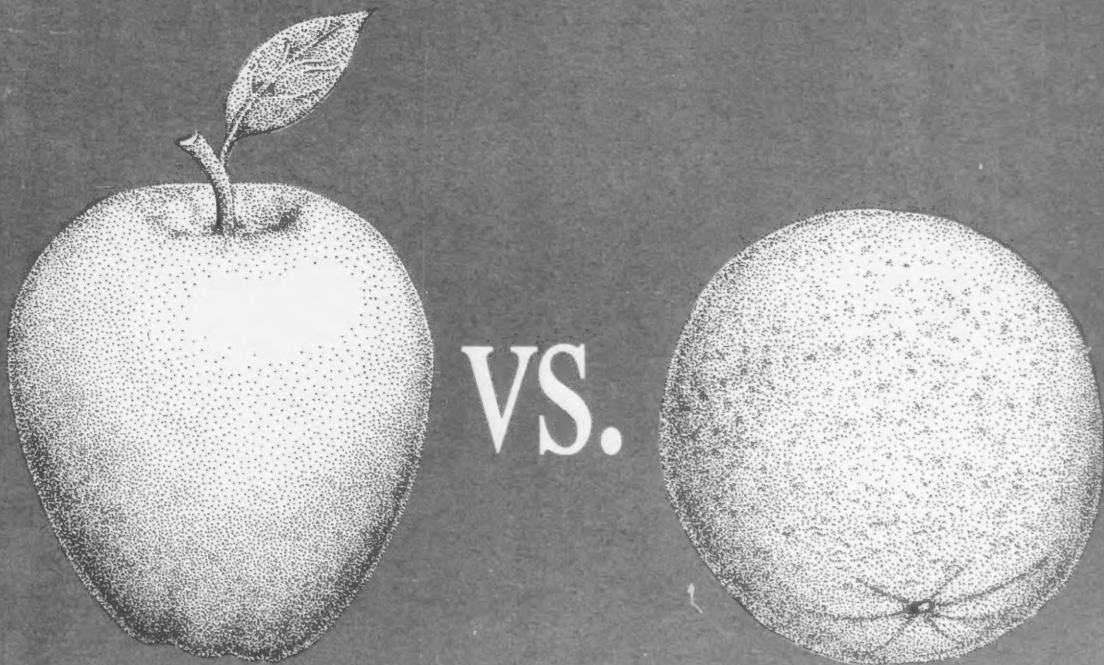
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3. Hiring Vs. Training



Experienced Programmers Or Trainees? A Productive Time/Cost Model

By Bradley Nelson
And James Lowrey

As companies consider training their own entry-level programmers, managers face the problem of trying to justify training from a productivity/cost point of view.

We will present a model that can be used to determine the productive times and costs of hiring vs. training programmers. The model considers two basic types of costs: the actual cost of hiring or training a programmer (acquisition costs) and the more intangible costs that are associated with the productivity of the acquired programmer (productivity costs).

The latter costs are developed by first calculating the productive times of hired experienced programmers and of trained entry-level programmers. This is done by subtracting the time spent in various learning curves from the total time the person is available for productive work. These times are then converted into costs. By looking at the differences in the productive times and costs, it is possible to get some valuable insights into the question of whether to hire or train programmers.

There are four major acquisition costs of hiring a computer programmer: cost of announcing the position, interview costs,

IN DEPTH

Acquisition Costs For Hiring a Programmer

Position announcement

- Set up cost for special recruitment program (internally and/or through employment agency).
- Newspaper advertising.
- Periodical advertising.
- Other promotion.

Interview costs

- Interviewee (if he/she is paid to come to be interviewed).
- Transportation.
- Hotel accommodations.
- Expenses (per diem).
- Interviewer (if interviewer travels to do interviews).
- Transportation.
- Hotel accommodations.
- Expenses.
- Facilities to do interviews.
- Receptionist (if necessary).
- Interviewer's time (based on salary).
- Personnel.
- Computer systems department managers.

Hiring costs

- Agency fees.
- Correspondence (and telephone conversations) extending offer, bargaining, confirming terms (date, salary, benefits, responsibilities).
- Administrative costs associated with a new hire coming on-line (for example, establishing personnel records).

Relocation costs

- House-hunting trip(s).
- Closing costs assistance.
- Moving.
- Travel.
- Lodging.
- Lodging while looking for permanent residence.
- Expenses (per diem).
- Other.

Figure 1

hiring costs and relocation costs. Figure 1 describes these costs in finer detail. Departmental records and personnel should be able to provide most of the information (estimates) necessary to quantify these costs.

The first two costs, for position announcements and interviews, should be averaged over all people interviewed. The last two costs, hiring and relocation costs, should be averaged over all programmers hired. This could be an overall company figure; however, overall company figures may understate the average for programmers. The sum of the four average costs will give you the

Acquisition Costs For Training a Programmer

Selection

- Development of selection procedure.
- Implementation of selection procedure (for example, posting in company's job opportunity program).
- Prescreening applicants.
- Aptitude test (if used).
- Selection of applicants to be interviewed.
- Interview costs.
- Facilities.
- Interviewer's time (based on salary).
- Interviewee's time (based on salary).
- Final selection of applicant and notification.
- Validation study (if desired).

Training

- Vendor cost.
- Student salaries and benefits.

Placement

- Orientation for managers being assigned graduates (if desired).
- Administrative costs (for example, changing personnel records to reflect new assignment).

Figure 2

average hard cost of hiring someone.

The major acquisition costs associated with training computer programmers are selection, training and placement, as shown in Figure 2. Depending upon how many programmers you wish to train and how involved the selection process needs to be, the costs associated with selecting applicants can range from next to nothing to a significant amount. (As a preliminary to establishing costs for selection, see "How to Pick Candidates for Entry-Level Programmer Training," which begins on In Depth/1.)

In deriving the selection costs, the average cost of developing the selection procedure should be used, that is, the cost of development of the selection procedure divided by the number of times the selection procedure will be used. The cost of training should be available from various vendors who provide entry-level programmer training. You should be able to estimate the other costs with the help of the personnel department. The sum of the selection, training and placement costs divided by the number of students you wish to train will give you the average acquisition cost of training entry-level programmers.

As stated before, productivity costs are difficult to measure and are not normally considered in determining the out-of-the-pocket costs of acquiring a programmer. Some of these costs are often overlooked when users consider the hiring vs. training question, and others are given a disproportionate weight.

The Case for Hiring

A common argument for hiring rather than training is that an experienced programmer is far more productive than an entry-level programmer. While there is a learning curve associated with data processing, one

must be careful to consider several other learning curves: company, industry in general and applications.

One banker recently made the following comment to a group of people selected from within the bank to be trained as computer programmers: "Keep in mind, most of the experienced programmers we hire speak computers but don't speak banking, banking applications or [bank's name]. You, on the other hand, speak banking, [bank's name] and at least one banking application; and we are going to teach you how to speak computers."

An attempt should be made to quantify the learning curves in each of these four areas. You may want to acquire the subjective evaluations of a number of experienced programmers and managers.

Assume the entry-level programmers have an average of two to three years' experience with the company. These figures should be expressed as the average amount of time spent learning. These estimates can be used to develop a composite amount of time spent learning — the LCEP and LCELP described in Figure 3. The difference between these two estimates, however, does not truly reflect the difference of the productive time spent by these people. One must also consider their length of employment.

Reducing Turnover

Selecting applicants from within the company should help reduce the turnover rate. One effective measure is a 12- to 18-month residency requirement for the training program. Most people who are job hoppers or are dissatisfied with their jobs will have left the company before that time has elapsed. The residency requirement will help ensure that participants have a vested interest in their employer.

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Composite Learning Curve for Experienced Programmers

$$LCEP = DPLCEP + CLCEP + ILCEP + ALCEP$$

Composite Learning Curve for Entry-Level Programmers

$$LCELP = DPLCELP + CLCELP + ILCELP + ALCELP$$

Learning Curve Difference

$$LCD = LCELP - LCEP$$

Productive Time Difference

$$PTD = (LSELP - LCELP) - (LSEP - LCEP)$$

Cost of Productive Time Difference

$$PTDS = AELP(LSELP - LCELP) - AEP(LSEP - LCEP)$$

Total Cost for Productive Time Difference

$$PTDTS = (AELP(LSELP - LCELP) + \text{hard cost for training}) - (AEP(LSEP - LCEP) + \text{hard cost for hiring})$$

Where:

DPLCEP = data processing learning curve for experienced programmers

DPLCELP = data processing learning curve for entry-level programmers

CLCEP = company learning curve for experienced programmers

CLCELP = company learning curve for entry-level programmers

ILCEP = industry learning curve for experienced programmers

ILCELP = industry learning curve for entry-level programmers

ALCEP = application learning curve for experienced programmers

ALCELP = application learning curve for entry-level programmers

LSEP = length of service of experienced programmer

LSELP = length of service of entry-level programmer

AEP\$ = average experienced programmer salary (including benefits)

AELP\$ = average entry-level programmer salary (including benefits)

Figure 3. Productivity Costs of Hiring/Training a Programmer

HIRING VS. TRAINING

IN DEPTH

Other deterrents to programmer turnover are the good employee relations and satisfaction that result from offering new career opportunities. Career growth is especially appreciated by those who came in at the bottom. A company's commitment to providing career growth is generally reciprocated by the employees' commitment to the company.

Trained entry-level programmers should therefore have a lower turnover rate than hired experienced programmers. The personnel department should be able to supply information on the average tenure of a hired experienced programmer. You need to estimate what you feel will be the average tenure of a trained entry-level programmer. Subtracting the time spent learning from the length of service results in the time spent doing productive work. Therefore, the productive time difference between experienced and entry-level programmers can be calculated as shown in Figure 3.

A positive result indicates you have received that much more productive time from the entry-level programmer, while a negative result indicates the experienced programmer has been that much more productive.

Since entry-level programmers are, obviously, paid less than experienced programmers, the cost of the productive time difference should be calculated. The personnel department should be able to provide average salaries for experienced and entry-level programmers. Using the formula in Figure 3, you should be able to figure the cost of the productive time difference.

A positive (negative) value indicates you paid that many dollars (PTD\$) to an entry-level (experienced) programmer for the additional productive time (PTD). It is to be hoped that the cost of the extra time is less than the salary for that period of time. When the acquisition costs of hiring and training are added as shown in Figure 3 (under "Total Cost for Productive Time Difference"), the total cost for the productive time difference (PTDT\$) becomes even more informative.

An additional cost factor not previously considered is this: If the lengths of service of an entry-level and an experienced programmer are different (LSEP and LSELP),

the cost of acquiring a new employee is started over. A simple way of quantifying this is to multiply the learning curves and costs of hiring an experienced programmer by the quotient of

LSELP divided by LSEP. Of course, this does not account for inflation or the loss of production time while the company looks for a replacement.

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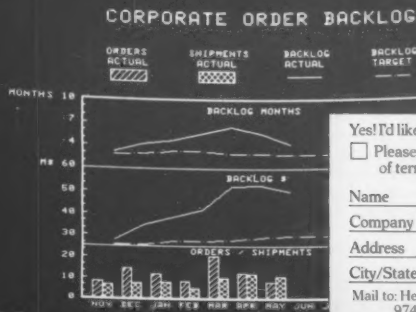
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HIRING VS. TRAINING

In Depth/24

IN DEPTH

Experienced Programmer				
Year	Salary (Monthly)	Benefits (30%)	Total Salary	Hourly Rate
1	1,800	540	2,340	\$13.30
2	1,950	585	2,535	14.40
Entry-Level Programmer				
1	1,200	360	1,560	8.86
2	1,500	450	1,950	11.08
3	1,800	540	2,340	13.30
4	1,950	585	2,535	14.40
5	2,100	630	2,730	15.51

(In today's dollars; inflation not considered.)

Figure 4. Salary Schedule

guage is Cobol.

The "experienced" programmer has two to three years' experience in the same basic hardware and software environment into which he is being hired. However, it is assumed that he will be new to the company, to the application and to the industry. The average starting salary is \$1,800 per month (see Figure 4 for assumed salary schedule).

For the entry-level programmer, we assume he has no previous data pro-

cessing experience, at least two to three years' experience with the company and no previous application experience. The salary average is \$1,200 per month (again, see Figure 4 for assumed salary schedule).

As mentioned earlier, the turnover rate plays an important role when one considers the overall cost of hiring and training programmers. The turnover rate per year for experienced programmers is assumed to be 30% (the industry average); for entry-level programmers, it is 12% (based on observations at different installations). Assuming a first-in, first out replacement schedule and a constant level of employment, a 30% turnover rate converts to an average length of service of 1.67 years, whereas 12% converts to 4.17 years.

Learning Curve CLCEP

Although the formula shows a linear, accumulative set of values, in reality the four major learning curve activities take place concurrently. This example (see Table 1) shows the relative percentage of time spent in each learning area and the total elapsed time during which the learning takes place. For example, "5% 2-12" means 5% of a new experienced programmer's time for months 2 through 12 will be spent learning about this aspect of his job.

Each percentage contains a factor to cover such eventualities as having to repeat a task because of ignorance of the environment.

Some further definitions of the equations' components:

DPLCEP = time necessary to learn technical standards and installation-oriented utilities and software and time for ongoing technical training (assumed 5%).

CLCEP = time necessary to learn noncomputer-related facts about the company.

ILCEP = time necessary to learn about the industry in which the company operates.

ALCEP = time necessary to learn about the specific application being developed or maintained on the project to which the programmer is assigned.

Expressed in hours (assume 22 workdays a month, eight hours a day, or 176 productive hours a month), the experienced programmer will spend 251.7 hours the first year and 322.1 hours during his tenure with the company learning about his environment. This amounts to approximately 12% of the first year or 9% for his tenure with the company (assuming 2,112 hours in a year).

Learning Curve CLCELP

The factors for the learning curve of entry-level programmers are the same as for experienced programmers (data processing, company, industry and application learning curves), but the proportions are different.

The assumption is made that the entry-level programmer has com-



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HIRING VS. TRAINING

IN DEPTH

Year	Month	Percent of Time	Hours	Hours for Year
1	1	25%	44.0	
	2-3	20%	70.4	
	4-6	10%	52.8	
2	7-12	8%	84.5	251.7
	1-8	5%	70.4	70.4
				322.1
LCEP = DPLCEP + CLCEP + ILCEP + ALCEP 10% 1 2% 1-6 3% 1-12 10% 1-3 5% 2-12 5% 1-8				

Table 1. Learning Curve for Experienced Programmers

pleted his basic training program (assumed to be 360 hours, approximately nine weeks long). An additional factor in the DPLCEP (data processing learning curve) is that the entry-level programmer will need additional formal training during his first year.

It is also assumed that during his tenure with the company he will work on two different applications (see Table 2).

Based upon the above assumptions, a trained entry-level programmer would spend 410.1 hours in the first year and 839.5 hours during his tenure with the company learning about his environment. While he will take longer to come up to speed during the first year, this extra time will be absorbed during his tenure.

Figure 5 (on In Depth/26) shows the time spent in learning curves, the productive time and the cost of the productive time for each year of service. This information can be used to calculate the learning curve difference and the productive time difference.

During the first year with the company:

$$LCD = LCEP - LCEP \\ = 410.1 - 251.7 = 158.4$$

Or, during the employee's full tenure with the company:

$$LCD = 839.5 - 322.1 = 517.4 \\ PTD = (LSELP - LCELP) - (LSEP - LCEP) \\ = (8,800 - 839.5) - (3,520 - 322.1) \\ = 4,762.6$$

In the first year, the experienced programmer is more productive than an entry-level programmer. However, because of the differences in the turnover rates, trained entry-level programmers will spend considerably more productive hours (4,762.6 hours or 2.25 years) during their tenure with the company. What does this mean in dollars?

During the first year with the company:

$$PTD \$ = PTELP - PTSEP \\ = 15,078.83 - 24,741.99 \\ = -9,663.16$$

Or, through the employee's full tenure with the company:

$$PTD \$ = 96,903.75 - 44,003.43 \\ = 52,900.32$$

Based upon the above assumptions, while an experienced programmer is productive for 158.4 hours more during the first year, the cost of this productive time difference is \$9,663.16, or \$61 per hour. If one looks at a person's full tenure with the company, a trained entry-level programmer will be productive approximately 4,762.6 hours (2.25 years) more than a hired

Year	Month	Percent of Time	Hours	Hours for Year
1	1	52%	91.5	
	2-3	26%	91.5	
	4-6	21%	110.9	
2	7-12	11%	116.2	410.1
	1-12	7%	147.8	147.8
3	1-3	15%	79.2	
	4-12	5%	79.2	158.4
4	1-12	5%	105.6	105.6
	1-2	5%	17.6	17.6
				839.5
LCELP = DPLCELP + CLCELP + ILCELP + ALCELP 30% 1 1% 1 1% 1-12 20% 1 15% 2-3 10% 4-6 5% 7-12 10% 2-6 5% 7-12 7% 1-12 5% 1-12 5% 7-12 5% 1-12 5% 1-2				

Table 2. Learning Curve for Entry-Level Programmers

experienced programmer. The cost of this productive time difference is \$52,900.32, or \$11.11 per hour. This is substantially less than the hourly cost of hiring a new experienced employee.

The assumptions made for the acquisition costs for this example are listed in Figure 6. For this example,

the difference in the acquisition costs of hiring vs. training are insignificant (\$9,790 - \$9,580 = \$210). Therefore, the impact of acquisition costs on the total cost of productive time difference is minimal for this example. This may not be true for other examples. (Remember that the PTDT\$ only accounts for having to

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HIRING VS. TRAINING

In Depth/26

IN DEPTH

Trained Entry-Level Programmers					
Year	Average Salary* AELP\$	Number of Hours LSELP	Hours Spent In Learning Curve LCELP	Productive Hours PHELP	Productive Time Cost PTSELP
1	8.86	2,112	410.1	1,701.9	15,078.83
2	11.08	2,112	147.8	1,964.2	21,763.34
3	13.30	2,112	158.4	1,953.6	25,982.88
4	14.40	2,112	105.6	2,006.4	28,892.16
1/6 of 5	15.51	352	17.6	334.4	5,186.54
		8,600	839.5	7,960.5	96,903.75
Experienced Programmers					
Year	AEP\$	LSEP	LCEP	PHEP	PTSEP
1	13.30	2,112	251.7	1,860.3	24,741.99
2/3 of 2	14.40	1,408	70.4	1,337.6	19,261.44
		3,520	322.1	3,197.9	44,003.43

Figure 5. Productive Time and Costs

Acquisition Costs for Hiring a Computer Programmer	
Position announcement (three ads in trade publication)	\$1,000
Interview costs (transportation and expenses for one person to be interviewed)	600
Hiring costs (agency fees, 30% of annual salary)	6,480
Relocation costs (assumes 50% will have relocation costs and average cost of relocation at \$3,000)	1,500
Total hard costs*	\$9,580
*Other costs mentioned in Figure 1 absorbed as overhead and not included in calculation; therefore, this figure is understated.	
Acquisition Costs for Training a Computer Programmer	
Selection (assumes only a few people will be selected for training; therefore, procedure for selection is not very involved)	\$ 500
Training	
Vendor-run 35-day program	5,500
In-house orientation and training (two weeks; includes development, instruction and materials, but cost is spread over several people)	600
Student salaries and benefits	3,190
Placement (absorbed as overhead as was done above)	—
Total hard costs	\$9,790

Figure 6. Acquisition Costs for Hiring/Training Programmers

hire one experienced programmer, so it tends to be understated. The next section will shed some light on this.):

$$\begin{aligned}
 \text{PTDTS} &= (\text{PTSELP} + \text{cost of training}) - (\text{PTSEP} + \text{cost of hiring}) \\
 &= (96,903.75 + 9,790) - (44,003.43 + 9,580) \\
 &= 53,110.32
 \end{aligned}$$

This means that the total cost of the production time difference (that is, the additional 4,762.6 hours the trained entry-level programmer will be with the company) will only cost \$53,110.32, or \$11.15 per hour.

Normalizing for Turnover

The above figures do not reflect the cost of replacing the experienced programmers who leave during the tenure of the trained entry-level programmers. We can get some insight into these costs by multiplying the experienced programmers' times and costs by 2.5 (the turnover rate for experienced programmers [30%] is 2.5 times as great as for trained entry-level programmers [12%]):

$$\begin{aligned}
 \text{LCD} &= 839.5 - (2.5) (322.1) \\
 &= 34.25 \\
 \text{RTD} &= 796.05 - (2.5) (3,197.9) \\
 &= -34.25 \\
 \text{PTD\$} &= 96,903.75 - (2.5) (44,003.43) \\
 &= -13,104.83 \\
 \text{PTDTS} &= (96,903.75 + 9,790) - (2.5) (44,003.43 + 9,580) \\
 &= -27,264.83
 \end{aligned}$$

In other words, over a period of 4.17 years, hiring experienced programmers will provide you with 34.25 more productive hours than hiring an entry-level programmer.

These extra hours, however, will be very expensive. If you consider only salary differentials, the extra hours will cost \$13,104.83. If you consider the additional hiring costs, the cost of the extra 34.25 hours is \$27,264.83.

While the preceding figures are impressive, they are only part of the story. For example, they do not consider the costs in terms of delays and low employee morale that occur while a company is seeking a qualified replacement.

There are many factors involved in the decision of whether it is worthwhile to train entry-level programmers. Two of these considerations are productivity and cost.

The example provided in this article helps illustrate a model that can be useful in evaluating these considerations. While this example was not intended to be universal to all companies, it did illustrate that when one views the difference in productivity between hired and trained programmers and the cost of this difference, the case for training becomes much stronger.

If you disagree with any of the figures or assumptions used in the example, and we expect you will, we invite you to "plug in your own figures and crank the handle."

About the Authors

Bradley W. Nelson is an independent consultant based in Renton, Wash. He has 16 years' experience in data processing and has spent half of that time in computer-related education/training. His background includes teaching and consulting in an industrial environment.

James W. Lowrey Jr. has more than 19 years of data processing experience in a variety of technical and managerial positions. He has managed data processing education departments for Los Angeles County and Crocker National Bank and is currently head of communications and data processing education services for Hughes Aircraft.



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Microfloppy Drive, Color Plotter Bows

ARLINGTON HEIGHTS, Ill. — Amdek Corp. has introduced a microfloppy disk drive and a low-cost four-color plotter designed for personal or business computers.

The Micro-Floppy dual disk drive reportedly offers a 1M-byte capacity and is plug-compatible with standard 5-in. floppy disk drives. The new drive reportedly has a built-in power supply and accommodates two new 3-in. Micro-Floppy disk cartridges.

The Micro-Floppy disk cartridge features a flip-type, hinged-cover head that protects the disk from dust, scratches or fingerprints. The single-sided recording capacity is 125K- or 250K bytes for both sides with double-density capability.

The Model DXY Plotter reportedly has a 10-in. by 14-in. effective plotting range and figures may be easily drawn using the CONTROL or BASIC commands. The plotter functions may be expanded by adding additional read-only memory.

The Model DXY is furnished complete with four pens, pen holders and chart hold-downs. A Centronics Data Computer Corp. interface is furnished to permit easy connection, Amdek said.

The Micro-Floppy disk drive unit is priced at \$899; its cartridges are priced comparably with standard 5-in. disks, according to the vendor.

The DXY Plotter is priced at \$949 and is available for October delivery, the vendor said from Suite E, 2420 E. Oakston St., Arlington Heights, Ill. 60005.

Univac Adds Two Models To System 80 Mini Family

BLUE BELL, Pa. — Sperry Univac has announced two additional models of its System 80 minicomputer family. The System 80 Model 4 and Model 6 offer up to 4.8G bytes of disk storage and a disk cache feature that improves I/O throughput, according to a Univac spokesman.

The new processors are performance upgrades for the Models 3 and 5 processors, which were announced in April 1980. The Models 4 and 6 can be used as stand-alone units or as part of a distributed network, the spokesman noted.

The Model 6 processor offers approximately 56% greater internal performance than does the Model 4, according to Univac. Main storage on both the Models 4 and 6 starts at 512K bytes and reaches a maximum 4M bytes.

Enhanced Software

The Models 4 and 6 feature enhanced software said to offer improved job scheduling, optimized shared-file performance, enhanced memory management and a reported performance increase in the firm's Escort programming language.

Members of the System 80 series run under Univac's OS/3 operating system, which supports multiprogramming and a full range of programming languages, the vendor said.

Like the Models 3 and 5, which can be upgraded to the Models 4 and 6, the new

systems use a multiple bus architecture, emitter-coupled logic chips and large-scale integration.

A high-speed streaming tape drive for disk media backup comes with Models 4 and 6. The unit has a data rate of 160K byte/sec; the recording mode is phase-encoded.

The disk cache capability available with Models 4 and 6 reportedly reduces the number of read operations performed on the disks. The facility consists of system microcode and a portion of main storage that is set aside for use as a cache buffer, the vendor said.

In conjunction with the announcement of Models 4 and 6, Univac said that its 8470 disk drive, along with the 8417 and 8419 drives, now runs on all models of the System 80 line. The 8470 gives users almost 5M bytes of disk storage.

A newly announced integrated disk channel available on the Models 4 and 6 allows users to attach eight 8470 drives in addition to the eight 8417/8419 disk drives on a dedicated channel, making the total disk drive capacity 16 drives, Univac said.

Univac also announced the Model 2 workstation for the Models 4 and 6 processors. The Model 2 workstation, which is said to be fully compatible with the current Model 1 workstation, has a screen by

(Continued on Page 53)

HP Unveils Modularly Designed Micro System

PALO ALTO, Calif. — A modularly designed micro-computer system that features a detachable CRT monitor, a 270K-byte flexible disk drive and up to 512K bytes of random-access (RAM) memory was unveiled today by Hewlett-Packard Co.

The HP 86 is similar to the firm's previously introduced HP 85 desktop computer except that it includes a detachable CRT screen, more professionally-oriented software and a lower price tag.

The basic system costs \$1,795 — the first to carry a price of less than \$2,000, an HP spokesman said.

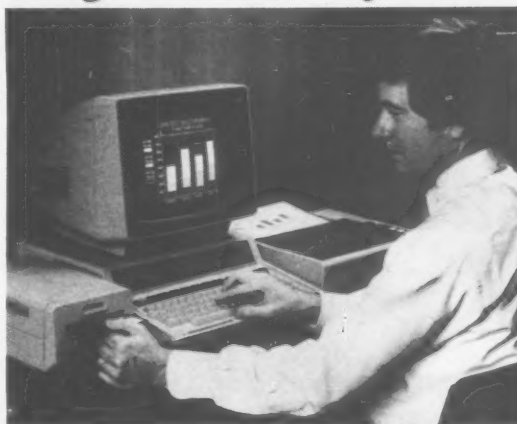
At the same time, the firm introduced an expanded-memory version of its HP-87A

computer, which was unveiled in March. The HP 87XM has built-in 128K bytes of user memory that reportedly can be expanded to 640K bytes. It also has 48K bytes of read-only memory, 16K bytes of display control and a built-in, rather than detached, HP-IB interface, the spokesman noted.

The HP 86 is positioned between the entry-level HP 85 and the expanded memory HP 87A. It has 128K bytes of memory, 64K bytes of RAM, 48K bytes of operating system read-only memory (ROM) and 16K bytes devoted to the display.

The basic system has a microprocessor, keyboard and

(Continued on Page 53)



The HP 86 features software for information management, accounting and word processing.

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INTERNETWORKING

Digilog Business Cuts Price Of Systems 1000, 1500, 1800

MONTGOMERYVILLE, Pa. — Digilog Business Systems, Inc. has announced price cuts on its Systems 1000, 1500 and 1800, and the Work Station 900 business computer.

Digilog credited "increasing economies associated with volume production and efficient manufacturing capacity" for the price reductions of the Zilog, Inc. Z80A-based desktop computers.

The System 1000-I now costs \$3,995, the System 1000-II costs \$4,995, the System 1500-I costs \$7,995 and the System 1500-II costs \$8,995.

In addition, the System 1800-I will cost \$9,495, the System 1800-II will cost \$10,195 and the Work Station 900 costs \$2,495.

Digilog is located at Welsh Road and Park Drive, P.O. Box 355, Montgomeryville, Pa. 18936.

Firm Unveils Own Version Of VT-18X Upgrade Kit

HOUSTON — C. Itoh Electronic, Inc. has introduced its own version of Digital Equipment Corp.'s VT-18X upgrade kit for personal computers.

The CIT-188 reportedly allows both C. Itoh's CIT-101 and DEC VT100 terminals to be upgraded to a 64K-byte Digital Research, Inc. CP/M-compatible, Zilog, Inc. Z80-based personal computer. Upgraded terminals do not lose any terminal features and will continue to operate in their accustomed environments, the vendor said.

The kit consists of a 64K-byte Z80-based computer board, a dual dou-

ble-density double-sided 5¼-in. floppy disk and all necessary hardware, cables and instructions. The configuration is priced at \$2,575.

C. Itoh can be contacted at 5301 Beethoven St., Los Angeles, Calif. 90066.

STC Enhances 6000 Series To Support Up to 1M Byte

WALDWICK, N.J. — STC Systems, Inc. has expanded its 6000 series of minicomputers to support up to 1M byte of main memory.

The firm said that the memory enhancement now allows the system to support up to 256 interactive terminals. Smaller System 5000 processors can be field-upgraded to the Series 6000, the vendor said.

A Series 6000 processor with 1M byte of main memory costs \$107,900, the vendor said from 4 North St., Waldwick, N.J. 07463.

Micro System Z80 Based, Has Accounting Software

SAN DIEGO — Dimension Systems Corp. has announced a 1M- to 40M-byte microcomputer system that comes with accounting software.

The Zilog, Inc. Z80-based microcomputer handles up to 16 users and operates under Digital Research, Inc.'s CP/M and MP/M operating systems. Both the desktop and floor models are manufactured in cabinets of walnut, oak or teak.

The 1M-byte system, including CPU, 120-char./sec printer and five accounting software modules, costs

\$6,650. The firm also offers other software such as legal, dental and medical packages.

Dimension is in Suite 202, 9948 Hilbert St., San Diego, Calif. 92131.

Multimode Printer Features Graphics Capabilities

HAUPPAUGE, N.Y. — North Atlantic Industries, Inc. has announced the Qantex 7020, a multimode printer that reportedly features near letter-quality and graphics capabilities.

The unit has three selectable print modes and operates in either a high-speed draft-copy mode of 180 char./sec or at 75 char./sec in a near letter-quality mode. In a graphics mode, the unit has a resolution of 144 by 72 bits mapped dot/in. at a repetition rate of 900 dot/sec, the vendor said.

The dot-matrix printer costs \$1,625, the vendor said from 60 Plant Ave., Hauppauge, N.Y. 11787.

Wabash Minidiskette Line Features 96 Track/In.

ROLLING MEADOWS, Ill. — Wabash Datatech, Inc. has announced a line of 96 track/in. double-density minidiskettes in single- or double-sided variations and one-, 10- and 16-sector formats.

Each diskette is certified for use at 77 or 80 tracks and reportedly meets or exceeds Ansi and ISO standards.

Single-sided versions cost \$5.95 each and double-sided versions cost \$7.95 each, a spokesman said from Suite 400, 2 Continental Towers,

1701 Golf Road, Rolling Meadows, Ill. 60008.

Winchester Disk Expands Affinity 16 Applications

LOS ANGELES, Calif. — TRW-Fujitsu Co. has announced a Nippon Peripherals Winchester disk for the Fujitsu Affinity 16 desktop computer. The disks are said to expand the applications of the Affinity 16 to include the high-performance processing needed in more comprehensive business systems.

Available in 5M or 10M bytes, the disk features an average access time of 170 msec and a transfer rate of 5M bit/sec, according to a vendor spokesman.

The 5M-byte disk is available for \$4,000, the 10M-byte disk for \$5,700 from TRW-Fujitsu Co., No. 620, 9841 Airport Blvd., Los Angeles, Calif. 90045.

Disk/Tape Combo Designed For IBM Personal Computer

HUNTINGTON BEACH, Calif. — An add-on Winchester disk/cartridge tape combination designed for the IBM Personal Computer has been unveiled here by Cybernetics, Inc.

The Cyberdrive reportedly features high performance levels and an integrated business-oriented backup device. The integrated minicartridge tapes used for backup of data allows dumping of up to 10M bytes of data, for example, in about 10 minutes, according to the vendor.

This product sells for \$5,750. Cybernetics is located in Suite 208, 8041 Newman Ave., Huntington Beach, Calif. 92647.

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HP-86 Micro Said Cheaper, Offers Detachable Screen

(Continued from Page 51)

four ports, which can accommodate HP's Model 82900 plug-in CP/M operating system, a modem, extra memory modules and additional ROM's. Optional equipment includes the Model 9130 flexible disk drive (\$850), which features a 270K-byte capacity and uses double-sided, double-density disks; a 9- or 12-in. CRT display, priced at \$295 and \$325, respectively; and a number of printers, including the HP 82905B — a dot-matrix impact printer with compressed and expanded type and a variety of print formatting options. That printer sells for \$795.

Software for the computer includes packages written for HP's Series 80 Basic and Digital Research, Inc.'s CP/M operating systems. CP/M-based applications packages for the systems are supplied by Peachtree Software, Inc. and include general ledger, accounts receivable and accounts payable programs.

All of the software is priced at about \$750 each, the vendor noted.

The HP-86 reportedly can also use a variety of word processing and electronic mail software, HP's Visicalc Plus and Ashton-tate's dBase II data base management software.

System 80 Gets Models 4 and 6

(Continued from Page 51)

pass capability.

A basic Model 4 — including processor, integrated controller for local workstations, diskettes, paper peripherals, console, disk cache, 524K bytes of main storage, one 118M-byte disk drive, one manual diskette drive, one 180 line/min. printer, system control and extended system software, the RPG-II programming language, editor and Escort — can be purchased for \$98,906 or leased for \$2,994/mo on a five-year agreement including maintenance. A similarly configured Model 6 carries a price tag of \$126,886 and a leasing fee of \$2,994/mo for five years.

First customer deliveries of the system are scheduled for this month. Univac is located at P.O. Box 500, Blue Bell, Pa. 19424.

Controller Offered As RLO Alternative

SUNNYVALE, Calif. — A single-card disk controller has been introduced by Advanced Electronics Design, Inc. as an alternative to Digital Equipment Corp. RL01, RL02 and RX02 controllers.

The Winc-05 is a dual-width embedded controller that is plugged directly into the CPU card cage. The system reportedly performs burst data transfer at 625K byte/sec. Up to four drives in a variety of Winchester and floppy disk combinations may be controlled by a single Winc-05.

The Q-Bus-compatible controller costs less than \$2,000. A typical system comprised of one 10M-byte Winchester and one 5¼-in. floppy costs \$6,800 from the firm at 440 Potrero Ave., Sunnyvale, Calif. 94086.

A complete HP-86 system is priced at less than \$3,900, the vendor said.

The expanded memory HP-87XM is said to have a basic 128K bytes of memory, which can be boosted to 640K bytes with the addition of a plug-in module.

The HP-87XM costs \$2,995.

Additional information on the two systems and other HP products can be obtained from the firm's local sales offices.

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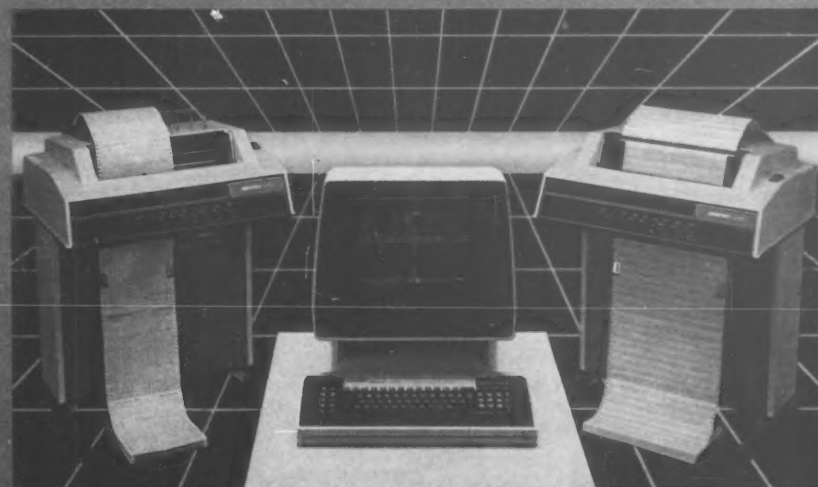
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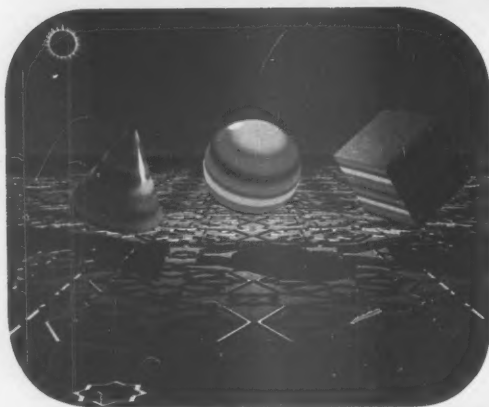
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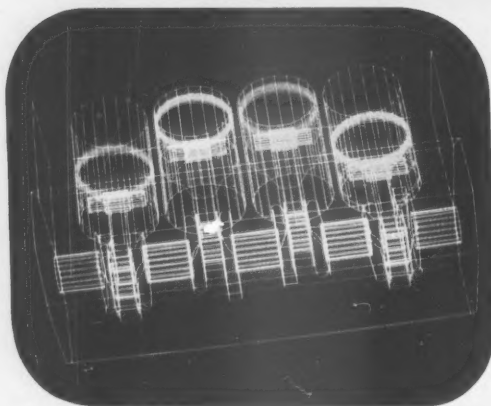
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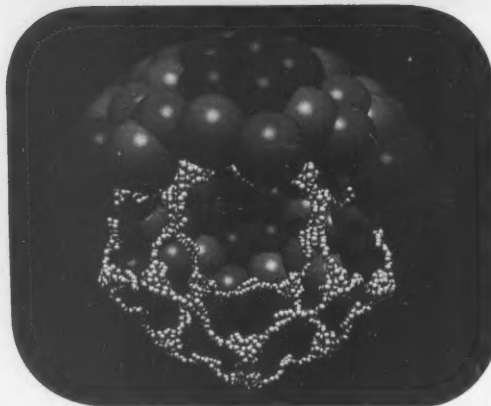
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Highest OA Salaries on West Coast Study: Top OA Pay in Diverse Regions

By Bruce Hoard
CW Staff

WILLOW GROVE, Pa. — Office automation workers are earning the highest average weekly salaries on the West Coast and in a four-state region comprising Arkansas, Texas, Oklahoma and Louisiana, according to the *Eighth Salary Survey* conducted recently by the International Information/Word Processing Association (IWP).

For instance, the study found that information managers averaged \$648.55 in the Arkansas-Texas-Oklahoma-Louisiana area. Word processing supervisors averaged a high of \$389.21 in the same area.

The high information manager salary was \$1,001, found in both Regions 1 (Montana, North Dakota, South Dakota) and 5 (Wisconsin, Iowa, Minnesota). The high individual word processing supervisor salary was found in Region 1 at \$1,001.

A total of 2,017 companies and 20,637 employees were canvassed during the survey, which broke data down into 10 Zip Code regions, 20 metropolitan areas and 27 industries.

Keying in on Five Jobs

Although 15 job titles were investigated, *Computerworld* keyed in on five:

- Information manager.
- Word processing supervisor.
- Word processing specialist II/assistant supervisor.
- Word processing manager.

• Word processing trainer.

An information manager is defined as someone who may be a vice-president or an assistant to the vice-president, with total responsibility for all aspects of an organization's office systems, including word processing, administrative support and other information processing functions.

A word processing supervisor is responsible for the operation of a word processing center (or section within a large center).

Word processing specialist II/assistant supervisors and word processing managers fared best in Zip Code Region 9 (California, Washington, Oregon, Hawaii), where their salaries averaged \$300.86 and \$442.68, respectively.

The highest word processing specialist II/assistant supervisor salary was \$575, which was recorded on the West Coast and in the Region 6 (Illinois, Nebraska, Kansas, Missouri) area. The highest word processing manager salary was found in both Regions 1 (Pennsylvania, New York, Delaware) and 4 (Michigan, Indiana, Ohio, Kentucky). That figure was \$1,001.

The IWP described a word processing specialist II/assistant supervisor as someone who is able to operate all the information processing equipment within the installation. Responsibilities include coordinating and assigning work, analyzing requirements for specific projects and communicating with users and others.

A word processing manager is responsible for the overall operation of a word processing center, including the guidance of supervisors, personnel administration, staff requirements, user liaison and evaluation and design and implementation of future word processing systems.

The highest average word processing trainer salary was \$324.89 in Region 1. The individual high was \$650 in Region 9.

A word processing trainer must have at least two years' experience operating word processing systems and spend a majority of the time training new operators, among other qualifications.

Low Salaries

On the low end of the scale, Region 9 — the area with the highest average word processing specialist II/assistant supervisor salary — was the site of the lowest, at \$107.

Other lows included:

- Word processing manager, \$212, Region 3 (Tennessee, Mississippi, Alabama, Georgia, Florida).
- Word processing supervisor, \$107, Region 9.
- Information manager, \$237, tie between Regions 6 and 0 (Maine, Connecticut, Vermont, New Hampshire, Massachusetts, New Jersey, Rhode Island).

The 80-page report also covers Canada and costs \$40, according to the IWP, which is located at 1015 N. York Road, Willow Grove, Pa. 19090.

OA Technology — Part 5 Execs See 'Long Road Ahead' for OCR

By Bruce Hoard

CW Staff

Although optical character recognition (OCR) technology has come a long way in the past few years, some experts feel there is still plenty of room for improvement.

Perhaps the biggest stumbling block in the path of OCR technology is the inability of devices to recognize multiple fonts, or type faces. That is changing, but slowly, according to Richard Matthews, vice-president of engineering at Dest Corp., a recent entry into the OCR market.

The latest machines recognize up to eight fonts, most of which are used with popular typewriters,

This is the final article in a series of updates on office automation technologies.

he said.

Over the past five years, OCR has been boosted into a position of viability by improvements in optical electronics technology, Matthews said. He noted that up until five years ago, the diodes used to scan documents were limited to arrays of 128, not enough to scan a page properly.

Now, diode arrays contain as many as 2,000 diodes in a row, providing the ability to scan fully an 8½-in. page without

the physical motion required of the earlier models, he said. The additional diodes, coupled with advances in microprocessor and software technologies, have combined to drive down the costs and sizes of OCR devices, the vice-president commented.

According to Matthews, the OCR page-reading process involves inserting a typed page into the OCR device, which begins to scan it line by line. Each line is digitized into a graphics bit-map representation, and each character is reviewed in graphics form through the use of various algorithms. The algorithms help the device determine what is, and what is not, a letter.

Whereas a dot matrix printer develops characters by taking bits to form dots and print letters on a page, OCR takes fully formed characters and translates them back into dot form so that it can determine letters, he said.

He predicted graphics reproduction will be an important future OCR application. "That's a market we see growing very fast," Matthews noted.

Richard Lindenmuth, vice-president and general manager of Burroughs Corp.'s Imaging Systems Division, said the OCR market is still quite modest, having achieved only about \$25 million in sales yearly, at

(Continued on Page 56)

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Page Readers Get Price Cut

BEDFORD, Mass. — ECRM, Inc. cut prices on its Concept series of optical character recognition page readers.

The Concept 2 page reader is now priced at \$17,500, down from \$19,900; the Concept 3 page reader has been reduced from \$25,900 to \$22,000; and the Concept 4 page-reader has been reduced from \$29,600 to \$27,250.

Base pricing on all the Concept models will include one standard recognition and one interface, either asynchronous or binary synchronous communications (BSC). Additional asynchronous or BSC interfaces are available for \$1,500 each, ECRM said from 205 Burlington Road, Bedford, Mass. 01730.

From System/34

Oak Software Converts WP to System/38

CLEARWATER, Fla. — Oak Software, Inc. has completed the conversion of its word processing system to the IBM System/38.

Originally written for the IBM System/34, Oak's new WP system reportedly adds full word processing functions to the System/38 and functionally compares with stand-alone systems with the added advantage of being resident on a mainframe.

The Oak system includes a full-screen text editor with 16 commands, automatic pagination, automatic table-of-contents generation, math functions, a built-in name and address file, access to data files and spelling verification. A guarantee that any function that can be found

in any other System/34 or System/38 word processor will be added at no additional charge, the vendor spokesman said.

The package price of the system is \$3,500 (available for \$2,500 for the System/34) and includes all pro-

grams and procedures, a 120-page user manual and training course and phone support, according to the vendor.

The system is available from Oak Software at 300 S. Duncan Ave., Clearwater, Fla. 33515.

'Dictapak' Library Package Debuts For Dictaphone WP Systems

RYE, N.Y. — Dictaphone Corp. has introduced a software library package designed for use with its word processing systems.

The Dictapak consists of several applications packages, including the

Legal Management System (LMS), designed for use with the dual-display word processor. The LMS software reportedly creates client bills, financial reports, management summaries, docket control and calendaring for law offices.

Dictapak also features enhanced versions of word processing and various other application software. It also reportedly enlarges the flexibility of Dictaphone's dual-display word processor, which previously offered records processing and math processing functions.

The product costs \$250, Dictaphone said from 120 Old Post Road, Rye, N.Y. 10580.

OCR Has 'Way to Go'

(Continued from Page 55)

though he expected that figure to jump to \$50 million within three years.

Those figures are based on a price range for OCR page-reading machines running from \$7,000 to \$30,000. He added that larger, more sophisticated machines are available for \$100,000 and more.

As far as leading vendors are concerned, he said Burroughs, Compuser, Inc. and Hendrix, Inc. all share between 25% and 30% of the market.

The drawbacks of OCR technology have included high prices, excessive size, too much required training and the limitation to certain alphanumeric characters. He also said users have to decide what fonts they want to reproduce before they invest in equipment.

The real impact of OCR will be felt in the integrated automated office, he claimed, noting OCR readers will serve as input devices to personal computers, word processors and intelligent printer/copiers, tying them into a system.

As it is now, there is no practical way to file or distribute incoming mail. "What I will need is some input device, probably very small, with the processing being done even remotely," Lindenmuth said. "In my estimation, OCR technology will be the key — critical and absolutely necessary — to the office of the future."

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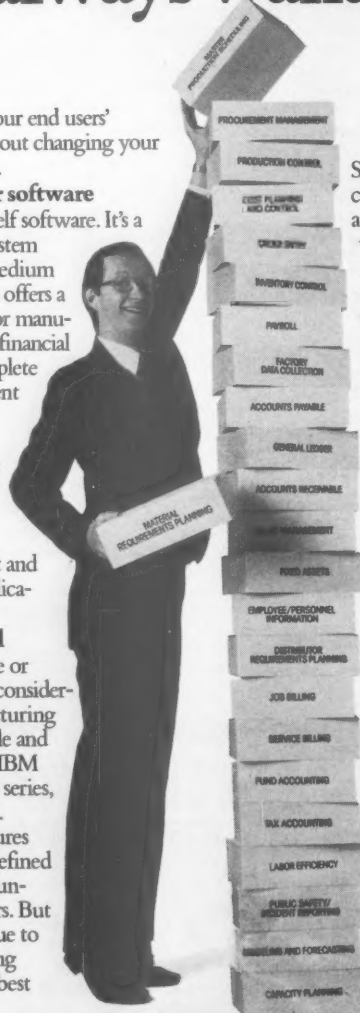
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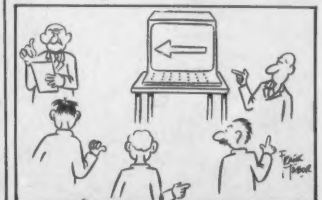
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'Smalltalk': Will It Usurp CP/M, Unix?

By Susan Blakeney
CW Staff

PALO ALTO, Calif. — Deep inside Xerox Corp.'s Palo Alto Research Center (Parc) lurks some rather unusual software, which one market research firm believes could blast existing operating systems out of the water. Just how and when it will be released is not yet known, but some think Xerox better hurry up before it's too late.

Xerox's anticipated Smalltalk, has been labeled everything from a next-generation programming language to a new type of operating system to a major software environment. It is actually an object-oriented language for microcomputers that "will dwarf Unix and CP/M," according to consultant Michael Killen of Strategic, Inc., of San Jose, Calif.

(Continued on Page 62)

Recession Seen Changing Face Of DP Consulting Market

By Bob Johnson
CW New York Bureau

NEW YORK — The recession is changing the complexion of the DP consulting market, according to a New York consultant's representative here who explained that tight money has forced users to cut back on consulting work and to demand top-notch technical skills from the consultants who are hired.

Sandra Peters, a principal in the consulting firm of Technical Representatives, claims that changes in her business' daily operation reveals that the money crunch has shaken up the once very comfortable consulting market. Among the changes she cited is a reduction in fees for the independent consultant, who once commanded salaries of \$1,000 a day and up

but are now settling for \$200 to \$300.

The cutbacks in DP spending are affecting independent consultants much more than large consulting firms, Peters said. She knows of three major New York financial institutions which recently "laid off" between 200 and 300 consultants.

Consulting in DP areas that are not particularly time-sensitive or crucial to corporate operations are being put off until the recession eases. "Only skills so specialized and critically important to the development of time-sensitive projects that cannot be found within the corporation are in demand," she stated.

As a result, independent consultants are being forced to seek full-time positions as

(Continued on Page 63)

DP Firms Cite Recession For Layoffs

The recession has been blamed for a series of layoffs in four computer companies across the nation.

Texas Instruments, Inc. of Dallas recently let go 125 of its administrative employees, bringing the total number of layoffs in the past 16 months to 7,000. "It is part of a continuing need to cut expenses in the economic recession," a TI spokesman said. The 125 employees were all located in the Dallas area.

Poor Economic Climate

Northern Telecom, Inc. of Minnesota recently laid off 155 workers. The cutbacks were attributed to a restructuring of the organization, which is being implemented earlier than expected, according to a company spokesman, because of the poor economic climate.

Another Twin City-based company, Control Data Corp., also recently let go about 260 manufacturing workers in its peripherals division — Magnetic Peripherals, Inc. (MPI). "Basically, we are attempting to reduce inventory in the peripherals area," a spokeswoman said. "There's a slowdown in the OEM marketplace."

The MPI employees who received notice had no more than a year's tenure and were given the option to apply for other jobs in the corporation or return to school on the firm's tuition reimbursement program, she added.

On Long Island, N.Y., 160 manufacturing and support personnel were let go from terminal manufacturer Hazeltine Corp.

The layoffs were made "primarily to match our terminal sales with the personnel," according to a company spokesman. "The recession is taking its toll on us as it is on other companies."

Limited Partnership Develops VLSI-Based Supercomputer

By Bohdan O. Szuprowicz
Special to CW

Somewhere in the world are 4,360 persons who late last year invested a total of \$55 million in Trilogy Computer Development Partnership Ltd., which is financing the development of an IBM-compatible, large-scale, high-performance supercomputer that is based on very large-scale integration (VLSI) technology.

What all those thousands of "limited" partners have in common is a minimum personal net worth of at least \$100,000 over and above the \$10,000 minimum investment in the partnership and a \$65,000 minimum annual income.

This is a U.S. Securities and Exchange Commission require-

ment regulating public investment in limited partnerships that are basically speculative

Analysis

and relatively nonliquid investments.

The management of Trilogy Systems Corp., the company developing the supercomputer, includes Dr. Gene Amdahl of IBM and Amdahl Corp. fame; Carlton Amdahl, the founder of Magnuson Computer Systems, Inc.; and Richard Eppel, until recently an engineering vice-president at Control Data Corp., responsible for the CDC Cyber 170 supercomputer architecture.

It is no small wonder that with a management team of that caliber, Trilogy had no problem raising the \$55 million development capital with the assistance of Merrill Lynch, which is the largest stockbroker organization in the world. Despite the large number of investors, it was not a public issue because it was done in the form of a research and development limited partnership, and it therefore reaped relatively little publicity.

American investors in such a partnership enjoy tax shelter advantages and can deduct their share of any losses of the general partner from their personal tax obligations.

The fledgling company ex-

(Continued on Page 58)

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R&D Tax Incentive Aids Supercomputer Plan

(Continued from Page 57)
pects to suffer losses for at least the first three years of operation before its first supercomputer is introduced sometime in 1984. After that there is a good chance that the partnership may dissolve into a public corporation, and the partners stand to make many times their already tax-deducted investment.

It's all perfectly legal and

results from a 1981 research and development tax incentive passed by Congress to stimulate venture capital investment in the U.S.

What Trilogy Systems is trying to do is develop a supercomputer that will capture a big share of the high-end

IBM-compatible computer market of the next generation. This is the market which in 1975 saw about 250 very large systems worth

\$1.1 billion shipped. By 1980 that market had increased to 1100 supercomputers valued at about \$3.6 billion; 1985 forecasts put the market at 2000 systems worth about \$7 billion.

The current supercomputers of the IBM 3081 caliber with which Trilogy must compete offer processing speeds of up to 10 million instructions per second (Mips), which is already well up

from the 3 Mips speed range of the large IBM 370/168 computers of the mid-1970s. Trilogy is developing its supercomputer to compete in the 12 Mips to 15 Mips range, which apparently can be achieved without increasing the unit price of future supercomputers by the proper utilization of very large-scale integration (VLSI) semiconductor technology.

This is where the plot of the

supercomputer partnership thickens a bit. In Bermuda, it turns out, exists a Trilogy Ltd., which is a holding company that sold the rights to use its semiconductor technology to Trilogy Systems and made commitments to sell any computers that Trilogy Systems may develop. It is not entirely clear exactly who Trilogy Ltd. is, but CII-Honeywell Bull of France is one of its shareholders.

Trilogy Systems itself, the general partner, is the hardware development company that received a contract from the partnership to develop the VLSI logic and the supercomputer design. By the end of 1981, Trilogy Systems already had 117 employees in an experimental laboratory in Santa Clara, Calif., and was finalizing a computer-aided design program. It was getting ready to move into more suitable facilities in Cupertino — located in the heartland of Silicon Valley — where no doubt it will be able to draw upon much design and logic testing talent in the future.

Many Fingers in the Pie

Trilogy Ltd. of Bermuda, on the other hand, is making plans to assemble the supercomputers in Dublin, Ireland, no doubt eyeing the tax and export benefits of the European Economic Community, to which Ireland belongs.

This is important also because CII-Honeywell Bull has an option to obtain licensing of Trilogy VLSI products in France for its non-IBM-compatible computers.

What's more, the U.S. Honeywell, Inc. holds sublicensing rights with CII-Honeywell Bull for the same technology, and apparently both CII-Honeywell Bull and Honeywell may also acquire the IBM-compatible technology from Trilogy if they decide to do so in the future.

An all-out attack on the next generation of IBM's supercomputer product line in the mid-'80s is clearly in preparation. IBM presently controls 80% of the large-scale computer market's global market, but Amdahl Corp.'s 470 systems has given it a run for its money by capturing 15% of the market. Fujitsu and Hitachi are the only other real competitors.

Now Trilogy appears to be competing with Amdahl itself and the Japanese Fujitsu-Hitachi combine in this market. The connection with France and Honeywell may be an ominous sign of the times in which the West is joining forces not so much against IBM, but against Japan, Inc.

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Points to Print Publishing

Civiletti Favors Minimal Controls on Videotex

By Brad Schultz

CW New York Bureau

NEW YORK — Former U.S. Attorney General Benjamin Civiletti told a recent conference here that government controls on electronic publishing and videotex should be kept about as minimal as those on print publishing, rather than as extensive as those on broadcasting.

"Government has no need to act as a surrogate protector," Civiletti declared with regard to marketing of information that is transmitted from the supplier's computer to the consumer's terminal.

Joining the former Carter administration official in a session of the Videotex '82 conference, Commissioner Anne Jones of the Federal Communications Commission (FCC) said that the FCC's role in videotex standards-making will be "very limited." Jones indicated that Congress probably will not — before this November's elections — pass legislation that would specify the extent to which the federal government may regulate computing-intensive areas of telecommunications such as videotex and electronic publishing.

Until Congress does, the FCC must comply with the 1934 Communications Act, which established the commission as a regulator of telephones and telegraphy.

Key Issues to Address

Civiletti, who is now an attorney in private practice, said the key issues videotex-related laws would address include: "Who's liable for what?" "How hard can 'soft porn' be?" and the security aspect of on-line information services. Regarding liability, jurists should distinguish between secondary electronic publishers — companies in the business of delivering, but not originating, computer-stored information — and originators of the information, he said, explaining that liability rests with whoever controls the content of the marketed information.

As for pornography, Civiletti noted that existing videotex terminals generally cannot display erotic pictures vivid enough to meet the Supreme Court's conclusion that pornographic material incites prurient interest, depicts sexual conduct and lacks artistic, educational or scientific value. However, substantial progress in graphics technology can be expected. Asserting that "some regulation (of electronic media) is necessary to strike a balance between competing values," the former attorney general said he would endorse enforcement of the following rules:

- A service that pipes political propaganda into the homes of subscribers should be available to those interested in presenting opposite viewpoints.
- The sponsor of any advertisement carried by electronic media should be identified.
- Liability for information sent through electronic media that "defames" an individual should be made clear to the individual.
- Subject to the Supreme Court's interpretation of the U.S. Constitution, local statutes banning publication of

pornographic and obscene materials should apply to electronic media.

Videotex suppliers and electronic publishers may find themselves subjected to regulations drafted as controls on broadcasters, Civiletti warned. But regulators and legislators should view electronic media as similar to print publications because consumption of either form of information distribution normally entails deliberate consumer participation. A country that values freedom of choice, in other words, should impose minimal constraints on companies that supply what people freely choose to consume.

According to the FCC's Jones, tele-

text — one-way transmission of information — has been subjected to regulation, while viewdata — two-way (interactive) transmission has been deregulated. In the past, teletext terminals have differed from viewdata terminals, she pointed out, but terminals capable of supporting both forms of videotex are beginning to proliferate.

This "convergence" worsens the problem of determining what may be regulated, Jones said, remarking that the FCC may soon be known as the "Federal Convergence Commission." The commissioner related that she was "not sure that the FCC should force convergence" through

rulings that create incentive for vendors to market terminals suitable for both teletext and viewdata.

Speaking on the agreement to end the antitrust prosecution of AT&T, which calls on AT&T to divest itself of 24 Bell operating companies, Jones declared "I have not been persuaded that (the divested Bell companies) should not be allowed to provide information (through electronic media)." Critics of the deal — which was announced last January and still awaits approval by federal Judge Harold Greene — have charged that the divested companies could regroup as monopolistic marketers of services such as videotex.

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Gov. Brown Sees Bright Side To Bid to Steal IBM Secrets

By Jeffry Beeler

CW West Coast Bureau

LOS ALTOS, Calif. — Gov. Edmund G. Brown Jr. sees a bright side to the current furor over alleged Japanese efforts to steal IBM trade secrets.

"I think we [in the U. S.] can take pride in the knowledge that we have something that other people want badly enough to try to steal," Brown said. "A lot of other countries don't have anything worth stealing."

The governor pointed to Silicon Valley, where the attempted theft allegedly took place, as indisputable proof that "wealth derives not just from the ground, but also from the products of the human mind."

Brown's reaction to the scandal involving Hitachi Ltd., Mitsubishi Electric Corp. and their U. S. subsidiaries came during a July 1 visit to the Silicon Valley headquarters of ASK Computer Systems, Inc. The occasion for his visit was an outdoor reception marking the independent software supplier's first anniversary as a public firm.

Asked if he felt the Japanese had inadvertently paid U.S. technological know-how a backhanded compliment, the governor nodded in assent.

Brown, a candidate for the U.S. Senate, praised Silicon Valley as the "heart" of a worldwide "revolution" in high technology — a status the IBM trade secrets theft case appears to have reaffirmed.

But although he focused primarily on the scandal's positive aspects, Brown stressed the importance of strictly enforcing the laws protecting proprietary corporate information.

He also defended — up to a point — the use of Abscam-like "sting" operations as a weapon for combating crime. "A fine line," he said, separates the appropriate and inappropriate use of undercover investigations, which played a major role in exposing the alleged Japanese theft scheme.

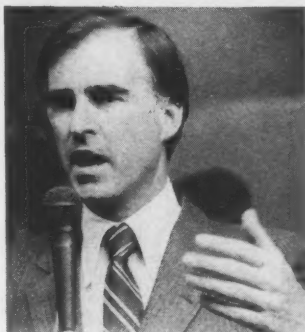
If a sting operation is mounted against a crime already in progress, its use can probably be considered legitimate, Brown said. An undercover investigation becomes questionable only when it is used to initiate some illegal activity.

Supershorts

Timeshared Business Systems of Palo Alto, Calif., which offers services to the transportation industry, has changed its name to Trail Blazer Systems.

Software Design Associates, Inc. has formed SDA Federal Systems, Inc. to provide data processing services to the federal government.

Software Centres International of Los Angeles (formerly The Software Store) has received approval from the California Department of Corporations to sell franchises, becoming the first software franchise chain in the world, according to a company spokesman.



CW Photo by J. Beeler

Calif. Gov. Jerry Brown

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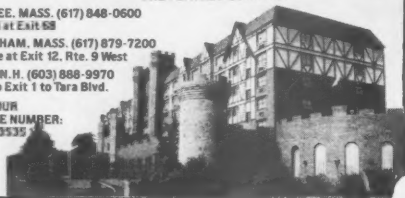
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Object-Oriented 'Smalltalk' Seen 'Dwarfing' Unix, CP/M

(Continued from Page 57)

Even though Smalltalk is intended for microcomputers, "it's the kind of thing every mainframe company would like to market," Killen said. "Companies like Fujitsu are incredibly interested in developing hardware that would run with something like Smalltalk," he added, suggesting that Xerox would do well to get on with it.

Smalltalk is being heralded as something more complex and versatile than Digital Research, Inc.'s CP/M, boasting features that include multiple windows, high resolution, graphics and more. According to a Strategic report titled "Personal

Computer Products and Markets," Smalltalk will take over the 16-bit system market as the new industry standard when it is finally released.

According to Strategic's report, Smalltalk is "an object-oriented language as opposed to procedure-oriented languages such as Basic, Pascal and Fortran." Smalltalk researchers at Xerox's Parc consider the language a "complete programming or working environment."

Major Advantages

The major advantages of Smalltalk over existing systems appear to be a user-friendly interface, its portability and device independence, Strategic said. Its report claimed that "Smalltalk is completely system-independent, being implemented as a virtual machine. Its only requirements are high-resolution monochrome display, a fairly fast processor and sufficient mass storage... Smalltalk has easily the best user interface available."

According to a Xerox spokesman, Smalltalk is a by-product of a research project dating back to the mid-1970s, when a group headed by Alan Kay — now Atari, Inc.'s chief scientist — was studying how people learned. Smalltalk was developed as a language that could be used by non-DP types, including children, explained Xerox, and now is thought of as a successful research tool.

Killen said Smalltalk represents a significant investment on Xerox's part, taking over 100 man-years to develop. He maintained that when Xerox executives realized what they had, they moved back the release date to figure out how to get the most mileage from this "great new technology."

The marketing strategy, Killen theorized, is taking shape now, and Smalltalk will probably come out by the end of the year. When asked if Xerox should be worried about people copying Smalltalk or trying to duplicate something competitive in the meanwhile, Killen said that "It would take at least a year or two to match it."

Smalltalk's license price is also not yet known, but according to Strategic's research, "With declining hardware costs, it will be possible to run full Smalltalk on a \$2,000 system in 1990, including display, processor, memory and mass storage."

Xerox declined to comment on the release date or future pricing structure of Smalltalk, but a spokesman did say that it would not be sold on its own. "We're not a software house — we're a systems house... Smalltalk will be available in connection with Xerox office systems."

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Emulogic, Inc., a manufacturer of microprocessor development systems, has completed \$2.5 million in financing with a venture capital group headed by Seven Rosen Partners of Dallas.

Other investors include Welsh, Carson, Anderson & Stowe, New York; Eastech Associates of Boston; and Massachusetts Capital Resource Co., Boston.

\$\$\$

Cosmos Computer Corp. has completed its initial round of financing, raising \$2.5 million in venture capital and \$1.8 million in a bank line agreement with Bank of the West, San Jose, Calif.

Venture capital investors include

Recession Seen As Affecting DP

(Continued from Page 57)

a result of the recession, she observed.

Peters said that the reduction in independents' fees will probably not continue and that they again will command top dollars. However, she added, their technical skills will have to be excellent.

She maintained that technicians who do actual high-technology implementation are feeling less economic pressure than those who are consulting generalists.

"Critical talents will continue to be the consultant's mainstay for awhile. These special skills and knowledge of applications will nurture the independent," she said.

An area on the permanent hiring side of DP has also been hurt by the recession, according to Peters. Middle and upper management hiring, especially in semitechnical areas is "way off" she said.

Drawing a parallel between the DP industry's employment maturation and the consultant's situation, Peters offered an historical look at how the consultant's value has changed.

Historical Perspective

"During the 1960s the dizzying speed of technological development in DP spawned consulting and consulting firms. Then in the early '70s the economic recession took its toll on the economy and DP growth, putting even skilled DPs out of work," she said.

The mid-to-late '70s brought a slow return to hiring, but the earlier recession left its impact and most of the surviving consultants were in large firms. This was the time when the DP consulting "specialist" emerged and with it the independent consultant.

"Instant corporations of one- and two-man firms with marketable talents were earning \$200 to \$1,000 a day per person," Peters recalled.

Companies could not hire independents fast enough because of their valuable and timely skills and their "outsider's vantage point" of all DP, she said.

"Consultants, large firms and independents were happy," she affirmed.

What is happening in the early 1980s is similar to what the DP consulting industry experienced in the '70s, according to Peters. She also predicted that the consulting market will again be strong.

Nickels & Dimes

Smith Barney Venture Corp., New York; New Enterprises Associates, San Francisco; Abingworth, Ltd., London; Associated Venture Investors, Menlo Park, Calif.; Genesis, Los Gatos, Calif.; and Robertson, Colman, Stephens & Woodman, San Francisco.

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Vertex Peripherals Corp. has raised \$3 million in the first round of equity financing. Three Calif. firms, Technology Venture Investors; Kleiner, Perkins, Caufield & Byers; and Hambrecht & Quist received an undisclosed number of shares in the company in exchange for the capital.

\$\$\$

Pyramid Technology has raised \$3 million in venture capital. Investors

include CH Partners of Bellevue, Wash.; Crown Advisors, New York; and Vanguard Associates of Menlo Park, Calif.

\$\$\$

Micro General Corp. will sell 775,000 shares of convertible preferred stock at \$1 per share, convertible anytime within five years to common stock at 50 cents per share, to obtain venture capital financing.

The sale is subject to shareholder approval at this month's annual meeting. Purchasers include Oxford Venture Fund of Stamford, Conn.; Innoven of Saddle Brook, N.J., and a limited number of private investors.

\$\$\$

Management Science America, Inc. announced a public offering 710,000

shares of common stock at \$21.25 per share. The company is offering 250,000 shares and 460,000 shares are being sold by certain shareholders.

\$\$\$

Icom, Inc. has sold 500,000 shares of convertible preferred stock to Cigna Corp. The shares, which are convertible into common shares, represent 20% of Icom's ownership.

\$\$\$

Thomson-CSF, a French electronics company, has invested another \$1.5 million in Fortune Systems Corp. bringing to \$20.5 million the total venture capital raised by Fortune in less than a year.

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Miniscribe Corp. of Longmont Colo. has secured a \$3 million line of credit with the United Bank of Denver.

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New Companies

Infographics, Inc. is a firm serving the business graphics market. The firm plans to set up a network of franchise operations to act as service centers for users of its graph production system throughout the U.S. and Canada. It is located at Suite E, 201 Shipyard Way, Newport Beach, Calif. 92663.

Courtney Eagle Associates, Inc. is a data processing con-

sulting firm specializing in the design, development and implementation of software products. The firm is located at 89A Van Wyk Road, Lake Hiawatha, N.J. 07034.

Computer Aided Engineering is a company specializing in the development of computer-aided integrated circuit design systems. Corporate headquarters are in Moffet Industrial Park, 1333

Bordeaux Drive, Sunnyvale, Calif. 94086.

Compuflex, Inc. is a firm whose objectives include teleprocessing payroll, accounts receivable, accounts payable, general ledger, file management and inventory control. Consulting for IBM/34, job costing, accounting systems, statistical management and industrial data bases systems are also available. The firm is located at 12355 Wormer, Detroit, Mich. 48239.

Brokerage Systems Software, Inc. is specializing in software development services and application products for the securities industry. For more information contact Alden Stevens, Suite 1415, 120 Broadway, New York, N.Y. 10271.

Automated Insurance Rating Services has been formed to market a micro-computer-based automated commercial-lines insurance rating system to the insurance industry. For information contact Warren Bess, Suite 101, 361 Randy Road, Carol Stream, Ill.

Computer Security Placement Service, Inc. is specializing in placing computer security professionals. For information contact Cameron Carey, Department R62, 370 Southwest Cutoff, Northborough, Mass. 01532.

Western Datacom Co. is a joint venture company that will manufacture and market data communications products developed by Western Reserve Communications, Inc. It is based in Suite 900, 5083 Market St., Youngstown, Ohio 44512.

Siecor Corp. has formed **Siecor Fiberlan**, an organization specializing in the development of applications for fiber optics in local-area networks. The firm will be located in Research Triangle Park, N.C.

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Executive Corner

• Kearney-National, Inc. has named four division executives to the position of corporate vice-president. They are: Philip S. Paul, president of Wabash Datatech, Inc.; Ronald W. Keipper, president of Wabash Magnetics Division; John A. Berger, president of International Products & Manufacturing, Inc.; and L. Alan DeRoo, president of Kearney-National (Canada) Ltd.

• Christopher J. Lynch has been appointed executive vice-president of Cosmos Systems, Inc., a subsidiary of CM Technologies, Inc.

• Frank P. Silkman has been appointed vice-president of worldwide field engineering at Data General Corp.

• Richard C. Tippettt has been named senior vice-president of operations of Computhink, Inc.

• Mark L. Braunstein has been appointed group vice-president and general manager; John D. James, vice-president for government marketing, and Stephen P. Miller, vice-president for operations and systems development of National Data Corp.'s Health Care Data Services Division.

• Aaron A. White has been elected vice-president, operations services, for Associates Bancorp, Inc., a subsidiary of Associates First Capital Corp.

• Gilbert B. Sheperd has been appointed vice-president of marketing and William J. Dobbin has been appointed vice-president of finance and administration for Cynthia Peripherals Corp.

• Stan Morgenstein has been appointed to the new position of vice-president of marketing at Inslaw, Inc.

• Richard R. Douglas has been appointed group vice-president, I.S. Marketing and Services Group, at Honeywell, Inc.

• Paul M. Vargo has joined Apache Electronic Systems, Inc. as vice-president, legal.

• Rene H. Caron has been appointed vice-president of sales for Ecco Computer, Inc.

• Robert Hazzard has been appointed vice-president of Star Micronics, Inc.'s newly formed Computer Peripherals Division.

• Roger P. Neilsen has been appointed to the new position of vice-president of marketing and sales at Raster Technologies, Inc.

• William G. Webster Jr. has been elected president and James H. Hart has been named executive vice-president of Star Computer Systems, Inc.

• James C. Towne has been named president and chief operating officer at Microsoft Corp.

• Everett T. Bahre, chairman and chief executive officer of Computer & Communications Technology Corp. (CCT) has assumed the post of president of Data Peripherals, a subsidiary of CCT, following the resignation of John F. Kevill.

• Paul J. Davies has been elected chairman of the board at Point 4 Data Corp. Geza Gorgenyi will continue as chief operating officer for the firm.

• James C. Castle has joined Memorex Corp. as executive vice-president/U.S. equipment.

• Vern H. Hart has been named vice-president, North American field service, at Microdata Corp.

• Avery Dee has been promoted to the new post of vice-president of corporate planning for Corvus Systems,

Inc.

• Barnell Albers has been named executive vice-president and Terence D. Jung has been promoted to senior vice-president for finance at Tres Computer Systems, Inc.

• Jack W. Simpson has been appointed president of Mead Corp.'s Data Central Division.

• John Holton has been appointed vice-president of marketing planning and Jack F. Thompson has been appointed vice-president of marketing operations in the Business Machines Group of Burroughs Corp.

• Louis J. Finnegan has been named vice-president of North American sales for Xylogics, Inc.

• Richard F. Suitor has been promoted to vice-president at Software Resources, Inc.

• Paul L. Klein has been appointed president and chief executive officer of The Braegon Co.

• Norman J. Nichol has been appointed president and chief executive officer of A.B. Dick Co.

• E.C. Jensen Jr. has been named president of Jack Henry & Associates.

• Francios Olibet has been named president of Videodial, Inc., the U.S. subsidiary of Telesystemes, a French videotex services company.

• Donald R. Landgraf has been promoted to president of List Processing Co., Inc.

• James M. Eckhart has been named president and chief operating officer of Prentice Corp.

• George V. Grune, a vice-president and director of The Reader's Digest Association, Inc. has assumed the post of chief executive officer of Source Telecomputing Corp. (STC). Bettie Alexander Steiger has been named vice-president of corporate relations and special assistant to Grune at STC.

• Angela Nanni has been promoted to the post of vice-president of Informatic General Corp.'s Professional Services Operations/East.

• Louise E. Hechtman Rehling has been appointed vice-president of research, development and technical services at SPSS, Inc.

• Robert M. Parent has been named vice-president of field technical operations for Honeywell, Inc.'s Information Systems Division. David R. Bergerson and John P. Karalis have been appointed vice-presidents and assistant general counsels and Laurence J. Marhoefer has been appointed vice-president and corporate patent counsel at Honeywell.

• Victor Weisenbloom was named corporate vice-president and general manager of Lundy Electronic and

Systems, Inc.'s Computer Graphics.

• Edward H. Currie has been elected vice-president and chief operating officer of Lifeboat Associates.

• Joseph J. Mikelonis has joined Halcyon Communications, Inc. as vice-president of finance and administration.

• Kenneth D. Morgan has been appointed vice-president, development, for McGraw Hill Information Systems Co.

• Terry Clark has been appointed vice-president of strategic and business planning for Inmac Corp.

• Lewis A. Bergins has joined Microcom, Inc. as vice-president of operations.

• Steven J. Puchkoff has been appointed vice-president, sales, for Concord Data Systems, Inc.

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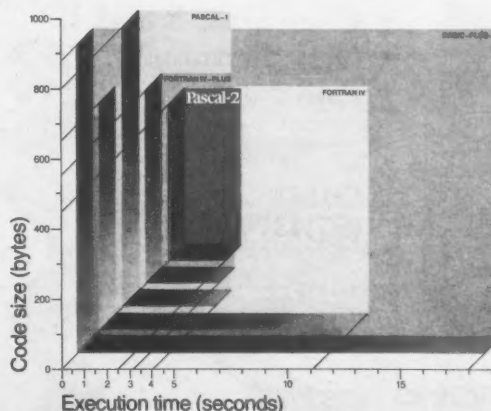
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Orders & Installations

STS, Inc. has installed its convention bureau housing service and information system for the Salt Lake Valley Convention and Visitors Bureau. The system, which runs on an IBM System/34, is capable of handling more than 20,000 conventioners at over 40 hotels simultaneously.

M/A COM, Inc. will provide complete satellite earth station systems including site surveys, installation and servicing for a nationwide satellite network for the Catholic Telecommunications Network of America. The value of the contract was not disclosed.

Computer Sciences Corp. has received a \$30.8 million extension of

its contract to provide support services to the National Aeronautics and Space Administration at Kennedy Space Center, Fla. The seven-month extension includes options for two additional months at an additional \$9.4 million.

Informatics General Corp. has been awarded a two-year contract by the National Institute of Alcohol Abuse and Alcoholism for the continued operation of the National Clearinghouse for Alcohol Information in Rockville, Md. The contract is valued at \$4 million.

The Houston Oilers and the Cleveland Browns have ordered MDS Qantel, Inc.'s Sport-Pac software to handle their ticketing, general accounting, scouting, player personnel profiles and game analysis functions.

Sentry Data, Inc. has signed a contract with Memorial Beach Hospital, Long Beach, Calif., to provide its full Financial System to the 998-bed medical center.

Avco Computer Services will provide Standard & Poor's Corp.'s Trendline Division with computer graphics services under the terms of a new, long-term contract.

Burroughs Corp. has been selected by the Society for Worldwide Interbank Financial Telecommunication S.A. (Swift) as the principal supplier of computer equipment for a new, second-generation system for international banking transactions. Swift is headquartered in Brussels, Belgium.

Icot Corp. has signed an agreement with the Chase Manhattan Bank to provide equipment for the bank's data communications network over the next several years.

Cablenet of Chicago has chosen LDM, Inc.'s subscription accounting system and a Burroughs Corp. B5900 computer for its in-house business management system.

MSI Data Corp. announced a chain-wide sale of hand-held portable data entry computer systems to Eckerd Drug Co. of Clearwater Fla. Eckerd, a division of Jack Eckerd Corp., has more than 1,200 stores in 16 states.

Computer Language Research, Inc., a firm specializing in computer services and computerized tax returns, has added the Inteltel 90/10 system to monitor all data communications lines between the company and its clients worldwide.

Dataproducts New England, Inc. has received an additional \$1.5 million under an existing \$4.5 million contract from Southern Bell Telephone Co. for network management and control systems.

Siecor Corp. has signed a contract with Citibank of New York for the supply and installation of 10 kilometers of fiber-optic cable that will connect five major locations. The value of the contract was not disclosed.

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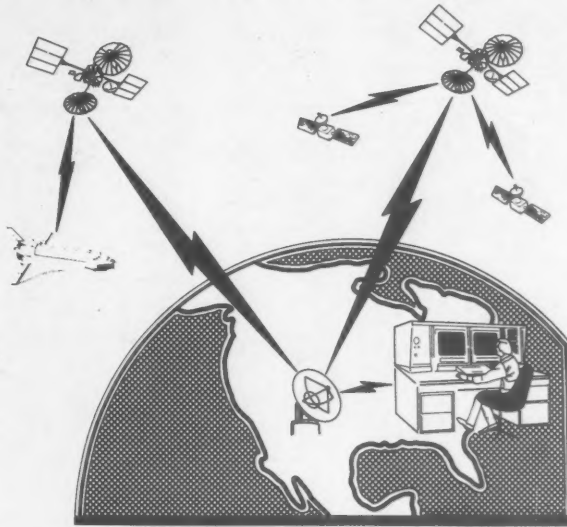
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The System Sciences Division's Spaceflight Tracking and Data Network/Network Control Center program, located in Greenbelt Maryland, a suburb of the Washington D.C. metropolitan area, is actively seeking software/systems oriented individuals to participate in the development of a large-scale real-time system. This system includes executive, data base, diagnostic and applications software. This network is needed to satisfy the high availability and processing requirements associated with NASA Ground Terminal System (NGT), Network Control Center (NCC) and the Tracking and Data Relay Satellite System (TDRSS). Software engineers will provide technical direction throughout the development effort, assist in the installation of the new software and monitor its performance.

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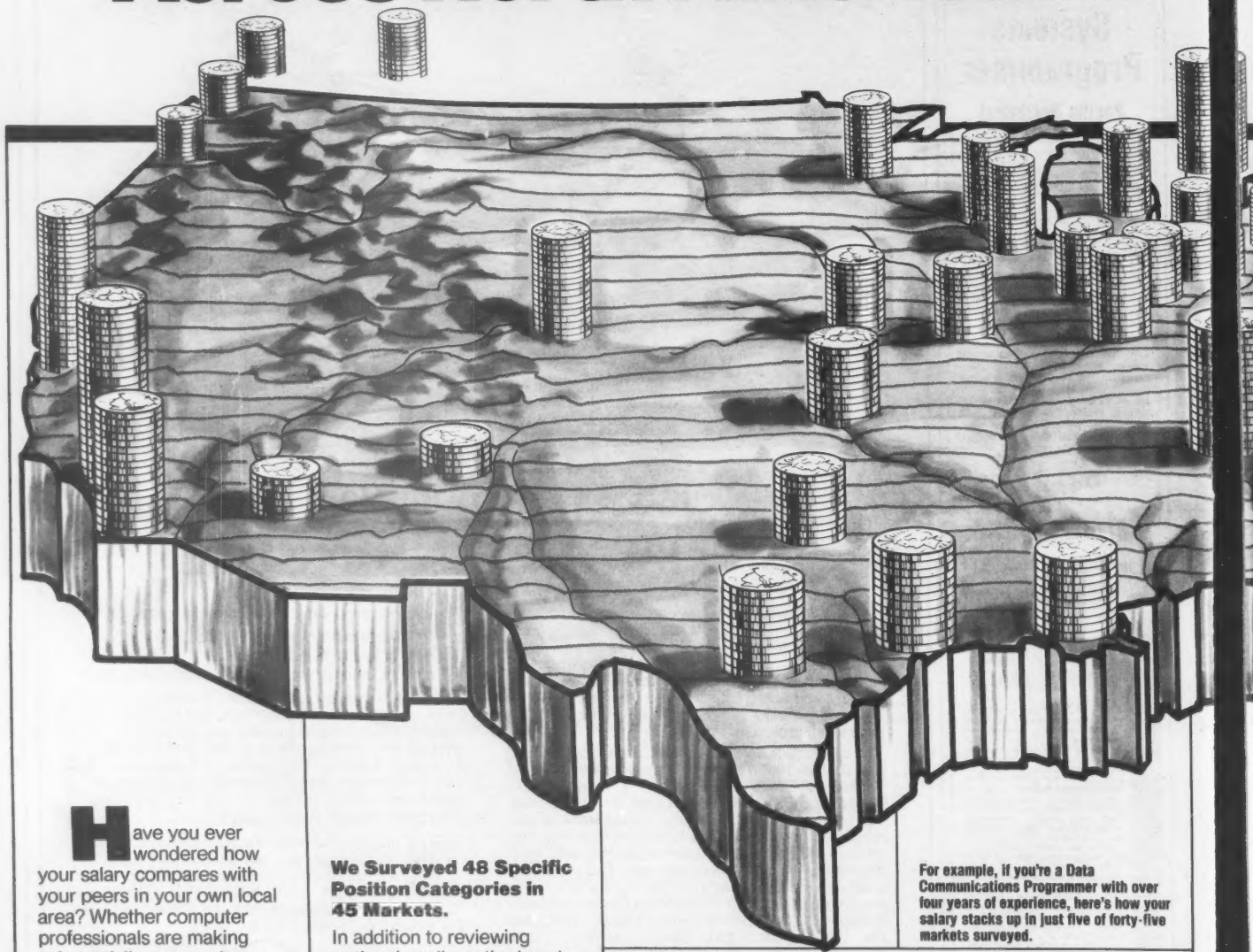
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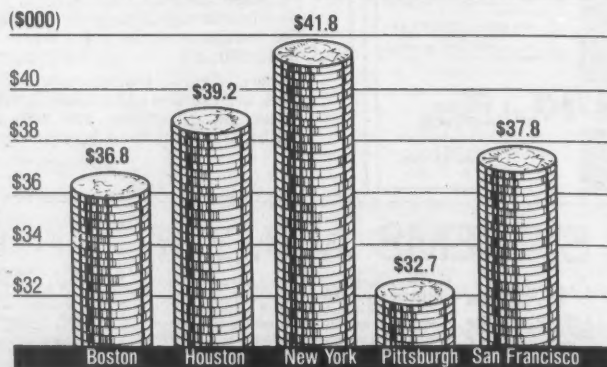
Our new report, the most complete Local Survey we've ever published, can show you exactly what others are earning in most major cities throughout the United States and in Canada. It's based on an in-depth analysis of our diverse client base as well as the thousands of computer professionals we are in contact with every month.

We Surveyed 48 Specific Position Categories in 45 Markets.

In addition to reviewing *national* medians, the Local Survey breaks out salary data by market. Forty-eight specific positions are reviewed in each city. Included are position categories in programming, software, systems design, data communications, mini/micro systems, data base, EDP auditing, computer marketing, management and others—at various levels of experience and at different size computer system sites.

That means, for example, a Minicomputer Programmer with two-to-four years of experience will be able to determine what his/her peers

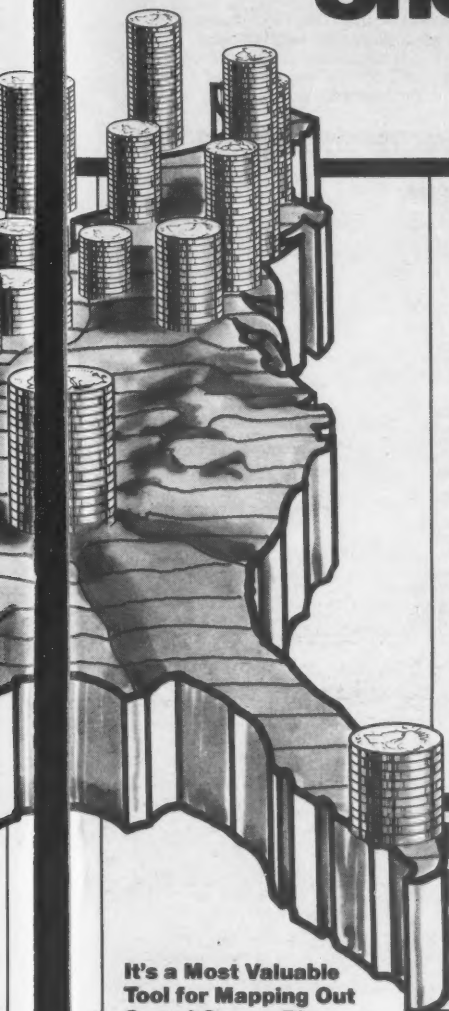
For example, if you're a Data Communications Programmer with over four years of experience, here's how your salary stacks up in just five of forty-five markets surveyed.



make in cities ranging from Albuquerque to Vancouver or Akron to San Diego.

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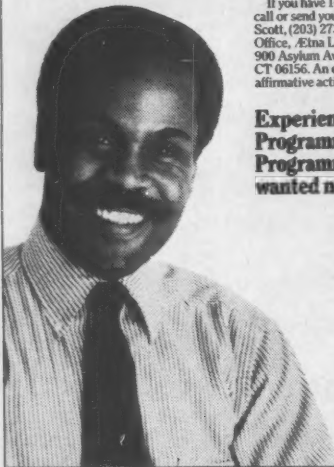
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Great Opportunity in Orange County with fast growth DP oriented Co. Data Base Systems experience required and CICS internals a plus. Fee Paid. To \$40,000

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Work in sunny Southern California for a large high tech Co. The work environment & computer hardware are first class. Your potential for growth is almost unlimited. To qualify, you should have a solid background combining education (preferably engineering or scientific) and work experience in graphics, engineering support and/or CAD/CAM Applications in FORTRAN.

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Subsidiary of National Conglomerate, located in Ft. Lauderdale, has an open position for Software Manager. Prior COBOL and heavy accounting systems design background are essential. You will supervise a staff of programmers, analysts and designers. Relocation and Fee Paid. Salary to \$40,000

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Trade 2 years of programming experience for the opportunity to be trained to be a systems analyst. State of the art MVS shop seeks a self-starting programmer who wishes to learn the latest state-of-the-art design techniques. Good communication skills and prior coding qualifies. Salary to \$25,000

MANAGEMENT

Suburban KC manufacturing company converting to System 38 needs an addition to their management staff. Prior DP Management experience & manufacturing systems preferred. Must program in RPG II and like a "shirt-sleeve" environment. Salary to \$30,000 + bonus

SYSTEM SUPPORT

Highly technical position requires working experience in IMS support. Must have 3 years plus technical experience on IBM equipment. Cross train on MVS. Suburban KC location with excellent benefits. Salary to \$35,000

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Must 5+ yrs 4300 DOS and CICS for Sr Technical slot. Gross Opportunity. To \$33,000

SYSTEMS PROGRAMMER

Design & Develop Data Bases with high level languages for R&D Center. To \$35,000

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Min 3 yrs exp with DOS/VSE and COBOL, design exp a must. CICS +. To \$25,000

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DATA BASE ANALYST

At least 2 years exp in data base management, to include DL1, COBOL and DOS. Pluses are CICS, ASSEMBLER, DATA DICTIONARY, HDAM (or HIDAM), and installation experience. **\$25-28,000**

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At least 3 years exp with COBOL, BASIC II, RPG II or III, and systems 34 and/or 38. **\$25,000**

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Atlanta, GA 30319

(404) 266-2153

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DEC PROGRAM/ANAL

Natl corp opening new facility. Using PDP/11, RSX-11M & Fortran. Salary to \$28,000

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Prominent SE Bank has opp for exp Analyst with COBOL & OS. Salary to \$32,000

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(919) 274-2448

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Need strong knowledge of the banking industry. DDA expertise essential. Requires COBOL programming experience in an IBM DOS or OS Shop. To \$32,000

SYSTEM 34/38

Newly created position in Mfg company. Looking for a Systems Analyst with system 34 or 38 background. RPG III also required. To \$24,000

John Staiger

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of Dallas, Inc.

Two NorthPark East, #750

Dallas, TX 75231

(214) 363-3300

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DATA PROCESSING

Mortgage Origination

Westchester

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WANG VS COBOL

SUPPORT ANALYST

Internationally recognized corp in midtown is offering a challenging career opportunity in their Support Resource Group. 2+ years DP with an expertise in WANG VS systems and programming in COBOL is required. Responsibilities include trouble-shooting, analyzing customer needs and technical support for field engineers. Excellent oral and written skills essential. Superior growth potential with this progressive leader in their field! Fee Paid. **\$28,000**

SYSTEM 34

ALL DEVELOPMENT

HEAVY SYSTEMS DESIGN

Prestigious commercial real est firm has an outstanding senior level position available. The qualified candidate must have 3-4 years Systems 34, RPG II experience with a strong systems analysis background. Responsibilities include incorporating the System 34 into all areas, heavy analysis and user interface with top management. Join this progressive, highly motivated and success oriented organization. Super benefit package. Fee Paid. **\$36,000**

SR PROGRAMMER/ANALYST

TEAM LEADER

OS/COBOL

Prestigious financial institution has a position available for the candidate with 4+ years OS/COBOL experience, strong design skills, some CICS and project life cycle background are required. Brokerage applications knowledge a plus. Responsibilities will include supervising junior staff in a developmental project, as well as interfacing with management level. Strong benefit package. Fee Paid. **\$35,000**

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SR SYSTEMS ANALYST

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SR MANAGER/CONSULTANT

Major national consulting firm seeks articulate, self-motivated individual with 10 years experience. Requires Masters degree. Must be familiar with project management in large mainframe shop. CDP a plus. Will start new department. Salary from \$45,000

CAD/CAM

PROGRAMMER/ANALYSTS

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SR SYS ANALYST

Well-estab \$200M mfr seeks tech astute analyst for sys deve proj. IBM 4341 DOS/VSE, COBOL, CICS environ with mfg & fin'l sys. Respon for design thru implem. Country setting. Salary \$35,000

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100 Summer Street

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(617) 423-1200

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(401) 274-8700

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FIN'L SYS ANALYST

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Outstanding oppty for DP pro with excellent written, verbal & presentation skills to lead DP mkt research activities. Work directly with DP mgmt to determine co's competitive strategy. Mini-micro, DB/DC exp qualifies. Salary to \$34,000

OS SYSTEMS PROG

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DOS/VS SYS PROG'S

CT oppty for indiv with DOS internals exp to be respon for all software & future exposure plans. Small co with a highly prof environ. Salary to \$37,000

CICS-IMS SR ANALYST

Excellent oppty for sr analysts/prog's with CICS/IMS exp to take charge of new state-of-the-art devel proj. Co offers outstanding benefits & multiple career path oppty's. Salary to \$35,000

DP DIRECTOR

CT oppty for fast track indiv with IBM, IMS, CICS, on-line bkgd to take charge of med size DP install. Ideal cand will be proj mgr or asst DP dir earning low-mid \$30's. Excellent oppty for the right indiv. Salary to \$42,000

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Burt Israel

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111 Pearl Street

Hartford, CT 06103

(203) 278-1710

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SR ANALYST

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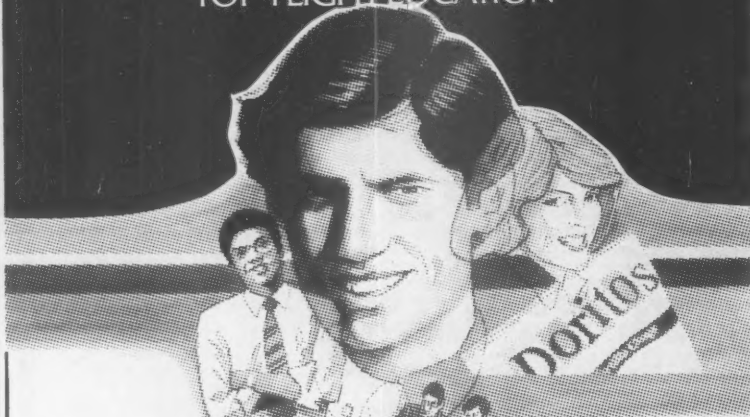
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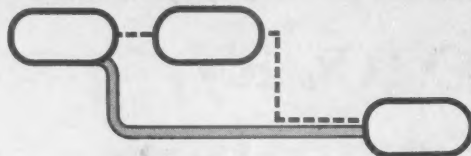
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SOFTWARE EXPERIENCE _____

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- DEC - PDP 11/23/34/44/45/70 - VAX 11 780 RSK 11M/K RSTS/E - VAX VMS - MACRO - 11, BASIC 2, FORTRAN/ASSEMBLY LANGUAGE
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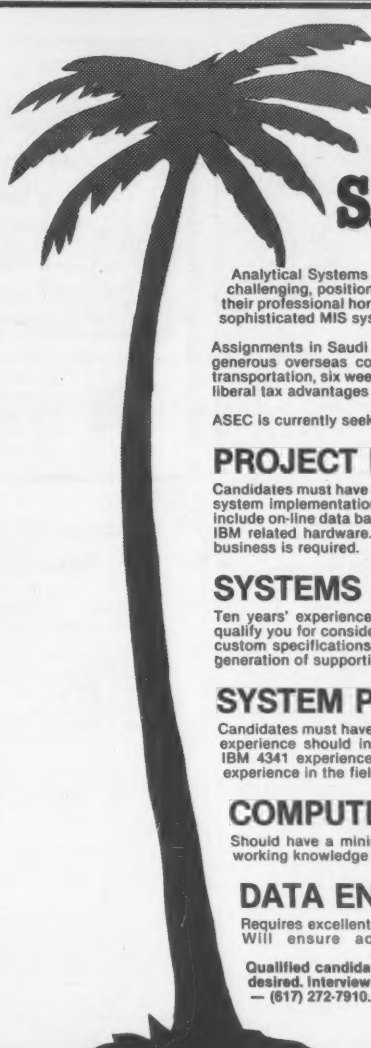
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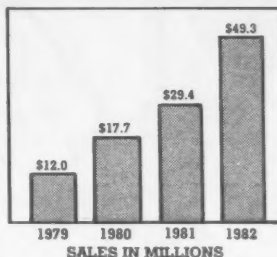
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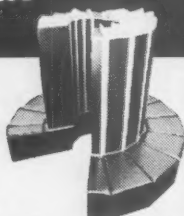
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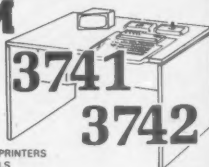
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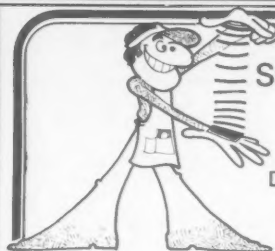
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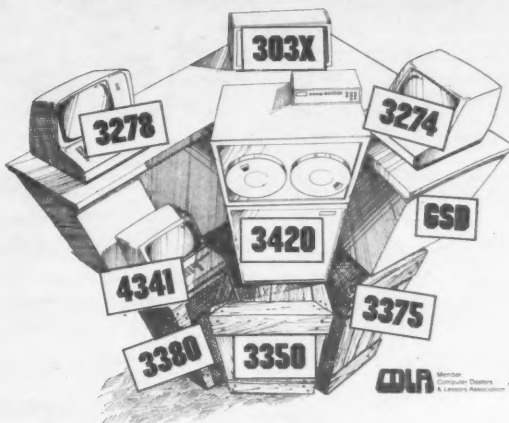
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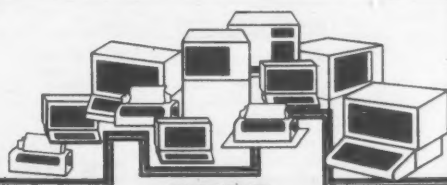
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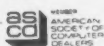
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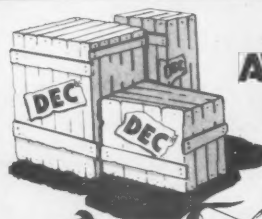
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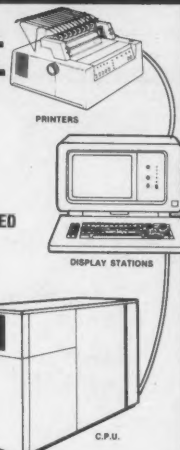
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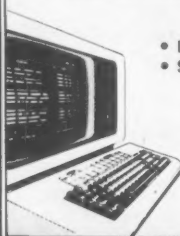
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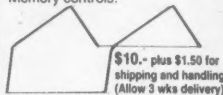
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The Bulletin Board

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How Does The Bulletin Board Work?

Bulletin Board ads come in standard units (one column wide by one inch deep) and standard typefaces. (Units may be combined to produce deeper ads, but one column is the maximum width and no units of less than one inch are available.) Ads are arranged under headings (such as "IBM", "DEC" or "Printers"). The headline of the ad is set in larger, bold type, and should contain the standard equipment identification. The body copy should describe the equipment very briefly and give the person to contact. This is all the information an interested buyer needs to follow up. No ad should have more than one piece of equipment or software.

Price for each standard unit is only \$99. (One unit minimum and no fractional units available.) Anyone can place an ad, but no agency commissions are paid, no quantity discounts allowed, and no credit toward rate is given for contract advertisers who advertise in other sections of Computerworld. It's a simple and effective system for buying and selling hardware and software.

How to Place an Ad in the Bulletin Board.

Ads are accepted in the mail, by phone or by telecopier. Ads can be accepted up until the Monday before issue (7 days in advance of issue date). You should write out your ad before submitting it. (The standard size will hold approximately 25 words of copy.)

Once you've written your ad, send it in with the coupon below or call one of our ad-takers. (If your company has never advertised with us before we request a check with your order.)

Remember that all ads are standard. No special typefaces, no borders and no logos are allowed. Ads are set on a six-column page in our classified section under the heading "The Bulletin Board." We assume no liability for errors beyond the price of the ad in the case of material errors.

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Copy: Copy for your ad must be clearly typewritten and may be sent in via the mail or by telecopier (telecopier extensions are 410 and 451). Ads may be given over the phone to our team of ad takers. The standard size is 1 column by 1 inch deep. These units may be combined to form larger sized ads. Describe the equipment very briefly, give the price and the name of the person to contact. All ads will be set up using a standard format. No borders or logos are allowed.

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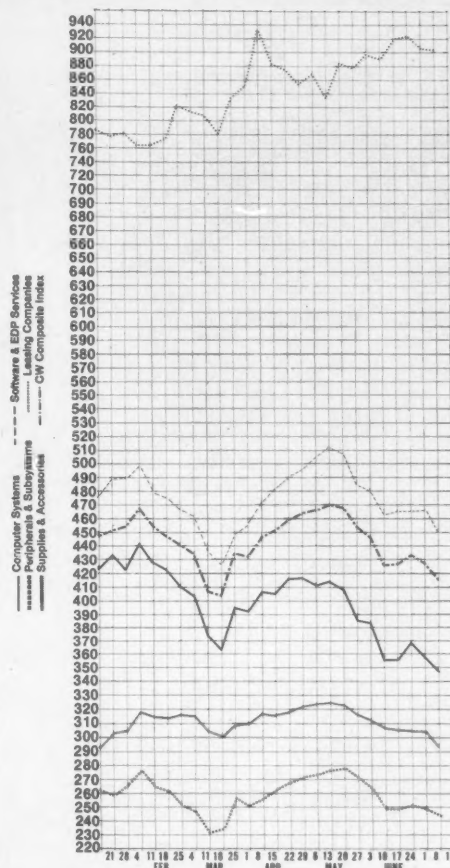
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CLOSING PRICES WEDNESDAY, JULY 7, 1982

TRADE QUOTES	X	H	PRICE	X	H	CLOSING PRICES WEDNESDAY, JULY 7, 1982	X	H	PRICE	X	H	TRADE QUOTES	X	H	PRICE	X	H	
	1981-82	CLOSE	WEEK	WEEK	PCT		1981-82	CLOSE	WEEK	WEEK	PCT		1981-82	CLOSE	WEEK	WEEK	PCT	
	RANGE	JULY 7	NET	CHANGE	CHANGE		RANGE	JULY 7	NET	CHANGE	CHANGE		RANGE	JULY 7	NET	CHANGE	CHANGE	
	(1)	1982					(1)	1982					(1)	1982				
COMPUTER SYSTEMS	A	AMPAHL CORP	18-46	17 3/4	-1	-5.3	G	ADVANCED COMP TECH	1- 6	1 1/2	0	0.0	A	COMPUTER CONSOLES	16-20	19 1/8	+1 1/8	-5.5
N	BURROUGHS CORP	28-72	31	-	1/2	-1.5	O	ADVANCED SYSTEMS INC	10-15	10 3/4	-	-4.4	O	COMPUTER SERVICES INC	4-10	8 1/8	+1/4	+3.1
O	COMPUTER AUTOMATION	8-28	9 1/4	+1/4	+2.7	-	O	ANACORP INC	10-18	12 1/2	-	-3/8	O	DATA CORP TRANSCORP	1-4	2 1/4	+1/4	-2.8
N	CONTROL DATA CORP	18-42	23 7/8	-	1/2	-2.0	O	ANALYSTS INTL CORP	3-14	6	0	0.0	N	COMPUTERVISION INC	20-49	25 1/8	-	-7/8
N	CRAY RESEARCH INC	20-49	23	-	1	-4.1	A	APPLIED DATA RES.	13-25	18 3/8	-	-5/8	N	CONRAC CORP	17-28	23 3/8	+1 1/8	-4.0
D	DATA GENERAL CORP	24-75	25	-	5/8	-2.4	O	ARC COMPUTER SYSTEMS	11-17	15 3/4	-	-3/8	A	DATA ACCESS SYSTEMS	2-13	3 1/8	-	-6.5
N	DATAPoint CORP	11-68	12 1/8	0	0.0	-	O	ASTRADYNE CORP INC	1- 8	1 1/8	0	0.0	A	DATAPRODUCTS CORP	1-17	1 1/4	0	0.0
N	DIGITAL EQUIPMENT	68-113	67 1/4	-2 5/8	-3.7	-	N	AUTOMATIC DATA PROC	22-32	22 5/8	-1 3/4	-3.1	O	DATARAM CORP	4-15	6 1/4	-5/8	-3.0
A	ECCO INC	8-19	8 1/4	-3/8	-4.3	-	O	CGA COMPUTER ASSOC	4-25	6 1/2	-1/4	-7.7	O	DATAIUM INC	2- 5	2	-1/8	-5/8
N	ELECTRONIC ASSOC.	5-13	6 7/8	+1/8	+1.8	-	O	COMPUTER ASSOC INT'L	0- 8	3 3/4	0	0.0	O	DAVID ARNISON CARLYL	3- 6	5 1/8	-	-1/8
N	FLOATING POINT SYS	13-30	18 1/2	-3/4	-3.7	-	O	COMPUTER HORIZONS	1- 3	2	-	-1/4	O	DECISION DATA CORP	3- 6	4 3/4	-3/8	-7/8
N	FOXBORO	25-62	26 3/4	+2	+8.0	-	O	COMPUTER NETWORK	4- 9	8 1/4	-1/4	-3.8	O	DELTA DATA SYSTEMS	2- 4	4 1 1/2	-1/8	-7.6
N	FULLCON CORP SUPP	1- 3	3	0	0.0	-	N	COMPUTER SCIENCES	10-11	10 7/8	-3/8	-5.2	O	ELECTRONIC R & R	1- 3	3	-1/4	-1.3
D	GENERAL AUTOMATION	27-16	3 7/8	0	0.0	-	O	COMPUTER TASK GROUP	10-23	10 3/4	0	0.0	N	EVANS & SUTHERLAND	18-40	24 1/2	-3/4	-2.8
N	HARRIS CORP	21-60	3 5/8	-1	-4.0	-	O	COMPUTER USAGE	2-10	2 1/2	+1/8	+5.2	N	GEN'L DATA CORP IND	7-19	8 3/4	+1/8	-1.4
N	HENLEY-PACKARD CO	33-54	41 1/4	-1 1/4	-2.8	-	O	CONSERV CORP	8-16	11 3/4	-3/4	-6.0	O	GENERAL TERMINAL CO	0- 4	3/4	0	0.0
N	HYUNDEI INC	63-115	66 1/4	-1	-1.1	-	O	CONSUMER	6-21	5 3/4	0	0.0	O	GREAT SOUTHWEST IND	1-12	4 1/2	-1/4	-2.2
P	IBM	48-73	61	+3/8	+0.9	-	N	CULLINAN DATABASE	15-37	24 3/4	-5 1/8	-17.1	N	HAZELTINE CORP	18-35	24 1/4	-1/2	-2.0
O	IGL SYSTEMS INC	6-13	5 3/4	0	0.0	-	D	DATA DIMENSIONS INC	1- 3	1 1/4	0	0.0	O	INFORMATION INTL INC	8-17	11	+1/4	+2.3
O	MAGNUSON COMP SYSTS	3-32	2 5/8	-3/4	-22.2	-	D	DATABAT	1- 4	1 1/2	-1/8	-24.9	O	INTEL CORP	21-51	29 1/4	-2	-6.3
N	MANAGEMENT ASSIST	8-28	10 3/8	0	0.0	-	D	DYATRON CORP	2-11	2 3/8	0	0.0	O	LPL SYSTEMS INC	5-15	5 3/4	0	0.0
O	MINI-COMPUTER SYS	0- 4	3 3/8	0	0.0	-	N	ELECTRONIC DATA SYST	15-30	26 1/8	-	-7/8	A	LUNDY ELECTRONICS	7-18	9 3/4	-1/4	-2.5
N	MODULAR COMPUTER SYS	7-32	7 3/4	-1/4	-3.1	-	N	INFORMATICS INC	10-12	10 1/2	-2	-18.2	A	MSI DATA CORP	11-27	3 1/8	-	-1.3
N	MOVIAK DATA SCI	10-32	11 1/2	0	0.0	-	O	INSYTE CORP	1- 3	3 1/8	0	0.0	O	NETWORK SYSTEMS CORP	14-25	17 1/2	-7/8	-2.4
N	NCR	38-78	51 3/8	-1 1/4	-2.3	-	O	IPS COMPUTER MARKET.	1- 2	1 1/4	0	0.0	O	OREX	3- 8	3 1/2	0	0.0
N	PERKIN-ELMER	10-38	17 7/8	+1/8	+0.7	-	O	KEANE ASSOCIATES	4- 8	4 1/4	-1/4	-5.8	N	PARADYNE CORP	25-52	27 3/4	-1/8	-4.8
N	PRIME COMPUTER INC	18-48	16 5/8	-3/4	-3.7	-	A	LOGICON	12-38	15 1/4	+1/2	+3.3	A	PENRIL CORP	7-17	9 1/8	-3/8	-3.8
N	SPERRY CORP	21-65	17 1/2	+1/8	+0.3	-	O	MNOT SCI AMER INC	17-28	21 1/4	-1	-4.4	O	RANTER CORP	9-23	16 1/4	-3/4	-4.8
O	TANDEN COMPUTERS INC	13-35	17 1/2	-5 1/2	-23.8	-	O	MATHEMATICA INC	12-28	13 3/4	-1/4	-1.7	O	RECONSTRUCTION EQUIP	1-11	1 1/2	-3/8	-4.8
O	TEDES INSTRUMENTS	22-48	22 5/8	-1/8	-6.7	-	O	MATHEMATICAL APP GRP	14-18	14 1/8	-	-2.8	O	SCAN DATA	1- 5	1 1/2	+1/4	+20.0
A	VARIAN ASS	22-48	22 5/8	-1/8	-6.7	-	O	NATIONAL DATA CORP	12-28	13 3/8	-2 3/8	-15.0	O	SCAR DATA	18-40	20	-	-4.7

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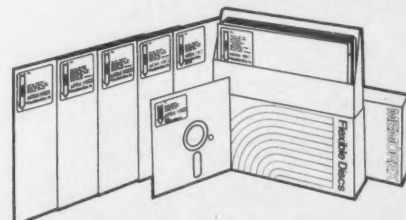
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